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INCLUDING THE RAILROAD GAZETTE AND THE RAILWAY AGE

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The vote of the French senate for the acquisition by the state of the railroad system of one of the six great companies, the Western, marks the surrender of the more conservative interests to a movement which has been years in progress and doubtless could no longer be resisted safely. The lower house had repeatedly voted in favor of the measure; but various ministers who, when deputies, had committed themselves in favor of it, have apparently desired its defeat in the senate, not so much because of change of views on the principle of state ownership as because of fear that with the present temper of the employees, and the power which their organization can exert, an administration aiming to do justice to the whole community could not be effected. Socialist deputies, whose ideal would be the nationalization of all productive property, have, when responsible ministers, opposed measures demanded by the employees, feeling sure that they would soon result in national financial disaster. Of all countries in the world, except perhaps Prussia, France seems at first glance best prepared to undertake the management of its railroads. It has always virtually owned them. Every line has been laid out by the state and the substructure built at its own expense, and the six great companies which work them have had substantially a long lease (originally for 50 years), at the end of which lease (it was prolonged some time ago) the lines fall into the possession of the government, on its paying for the rolling stock. The state guarantees dividends on the shares of these companies, and a contribution to a sinking fund which will retire the principal at the expiration of the concessions. Its expenditures on account of these guarantees amounts to an enormous sum, and for several of the companies continues to this day. In 1906 the Western company required on this account about $1,200,000, working at that time 3,633 miles of road, and earning at the average rate of $13,804 gross and $4,768 net per mile. The companies have their operations closely supervised by government officials, and they can make no changes in rates without the approval of the Ministry of Public Works. Further, France has a highly trained and numerous technical corps, the oldest in the world, so efficient that the railroad companies themselves draw their leading operating officers from them. For a long time, moreover, it has had a small state railroad system (1,811 miles in 1906), which, though consisting chiefly of lines once chartered to companies, but so unprofitable that the companies were unable to complete them, was yet an admirable school of practice for the government officers. In 1906 this state system earned $5,909 gross and $1,526 net per mile. The systems of the six great companies may be described as, with one exception (the Southern), sections of a circle having its center at Paris. The Western lines reach the coast from Dieppe south to Brest, including the great port of Havre. Its traffic has been unfavorably affected by the improvement of the Seine below Paris. This was done at great expense, and no tolls are imposed. France is surrounded on all sides but one (Spain) by state railroad systems. In Belgium and Germany the governments have long worked the railroads; in Switzerland and Italy the state operation began recently. There has long been a strong party in France in favor of state operation, which early in the '80s seemed likely to prevail, but was avoided by new contracts with the companies, which then took on new obligations and had their concessions extended. Should results on the Western system improve notably under the state, other systems will probably be acquired; but France needs to move cautiously in assuming any additional financial obligations.

THE ECONOMY OF BALANCED COMPOUND LOCOMOTIVES.

The experiment work done in the locomotive testing plant at the St. Louis Exposition in 1904 was conducted with such great care and with such accurate and scientific methods of measurement, and the conclusions drawn were prepared by such experienced experts that we have good reason to place implicit reliance upon their correctness. An important item in the summary of conclusions as reported by the committee of the Master Mechanics' Association is as follows: "In general, the steam consumption in a simple locomotive decreases with the increase of speed while that of compound locomotives increases. From this statement it appears that the relative advantages to be derived from the use of the compound locomotive diminish as the speed is increased." It is important, therefore, in dealing with the relative economy of simple and compound locomotives that the matter of speed be constantly kept in view.

In the report of the committee on 4-cylinder compound locomotives, presented to the Master Mechanics' Association this year, a strong case is made to show the superior economy of

the 4-cylinder compound locomotive, but the important element of speed does not seem to have had due consideration. All the curves are plotted with respect to dry steam and horse power without reference to speed. The committee decided to base the economy on the comparative cost of fuel for a unit of work at the draw bar, and it gives as general average figures for the compound engine, when developing 800 horse power, a consumption of 2.7 lbs. of fuel per horse power at the draw bar, and for the simple locomotive, 4.85 lbs., showing the saving of the compound over the simple locomotive to be 44 per cent. The detailed figures relating to the test of the 4-cylinder compound at St. Louis are not given in the report of the committee as presented this year, but they are found in the report presented by the Master Mechanics' Committee in 1906. In that report we find that the Santa Fe compound No. 535 consumed 2.77 lbs. of coal per d.h.p. hour at a speed of 37.6 miles per hour; at the higher speed of 56 miles per hour the consumption was 4.41 lbs. and at 65.8 miles per hour, 5.6. With this higher speed the consumption was a little more than double that at the lower speed of 37 miles per hour, and for such wide variation as this in the fuel rate the comparisons of coal per h.p. hour are of little value unless constant reference is made to the effect of speed.

The New York Central 4-cylinder compound locomotive, No. 3000, which was tested at St. Louis, showed a consumption of 2.75 lbs. of coal per d.h.p. hour, and this economical performance was only obtained at the lower speeds, below 20 miles an hour. At 56 miles an hour the consumption of coal was 4.5 lbs. and at 75 miles, 4.65 lbs. The report of the simple engines tested at Altoona show that the engine No. 3,162 with Walschaerts valve gear consumed 5.37 lbs. at 37 miles per hour, this being the only speed at which this coal item was reported. The simple engine 5,266, with Stephenson link motion, as tested at Altoona, showed a consumption per d.h.p. at 38 miles per hour of 5.38 lbs. coal; at 57 miles per hour, a consumption of 5.77 lbs.; and at 66 miles per hour a consumption of 5.92 lbs.

In making a comparison of coal consumption of simple and compound locomotives, especially with the 4-cylinder compound, the performance at high speed is of the greatest importance. The 4-cylinder engines are especially adapted to high speed work on account of their uniform wheel pressure on the track, due to lack of disturbance of the counterbalance, and on account of the large amount of steam which can be worked through the cylinders at a long cut-off, thus obtaining a greater h.p. at high speeds. For these reasons the 4-cylinder compound locomotive was developed for very high speed work in France, and it has been used to some extent in England, Austria and Bavaria. In the United States only one road has used it extensively for passenger service, but some of the highest speeds attained in recent passenger locomotive performance have been with the 4-cylinder compounds.

As was said above, any comparison of 4-cylinder compounds with other types of locomotives should be with reference to their performance at the higher speeds. The comparison made by the committee was under conditions when the engine developed 800 d.h.p., indicating a speed, with the New York Central engine, of not over 20 miles per hour. It would seem to be more correct to make this comparison from figures obtained at the higher speeds, which would be the normal condition of running for the 4-cylinder compound. If we take the figures, therefore, for the two compounds tested at St. Louis, with a speed of 56 miles per hour, we find the coal consumption per d.h.p. 4.5 lbs., and for the simple engines tested at Altoona with a speed of 57 miles per hour, the coal consumption per d.h.p. was 5.77 lbs., and the saving represented by the difference in these two figures is only 23 per cent., as compared with the 44 per cent., as given by the committee report. As the railroads in this country are looking to the results from the testing plant at Altoona as a reliable guide for development of their practice, it would seem important in making reports of this kind that the conditions under which the figures are obtained are fully reported and are thoroughly understood. The conclusion from the St. Louis tests, quoted above, has doubtless discouraged the more extensive use of the 4-cylinder compound on the railroads of the United States; the conclusion which is presented to the Master Mechanics' Association this year does not appear to be consistent with that drawn in the St. Louis report, and the railroad officer having both reports and reading only the general conclusions would be at a loss to decide whether it was best for him to use 4-cylinder compounds for fast passenger service or not, and we hope that a more definite and conclusive interpretation of the results of these experiments on simple and compound locomotives will be available.

THE JUNE CONVENTIONS.

It is the common and annual re-expression of a forgotten opinion that each June convention as it swings into its place is "the best that we have ever had." Yet, in the review of these great mechanical conventions of the past two weeks, there are some peculiarities that stand out pre-eminent and make for an excellence along certain lines that really seems "the best," of a long line of successes.

When in 1905 the meeting of the International Railway Congress was held in Washington, it was feared that the effort made to hold a large exposition in connection with it, and the reports that would be read, would detract from the following conventions at Manhattan Beach, but to the surprise of everyone, the Washington show was merely a preliminary canter, and the tremendous leap ahead made by the Master Car Builders' and Master Mechanics' associations a month later, is a matter of history. Then followed two successful seasons at Atlantic City, where the show was all that could have been desired, but has been entirely overshadowed and eclipsed by the exposition of 1908. The standard set by this year's display is so high that it will be difficult to equal it at any other place. The large airy rooms, cooled by the ocean breezes, and arranged with their delicate color tints in a manner worthy of the best of permanent expositions, gave visitor and exhibitor an opportunity to study and display to the best possible advantage. Then, too, the arrangements were so admirably made that everything was in place by the opening day. There was no confusion, no litter of packing boxes, no final adjustment of decorations, but for the first time in the whole history of fairs and exhibits, small or large, everything was in readiness on the opening day, and the visitor was given a feeling of restfulness that he never had before. Certainly there has been skillful management, for the admirable adaptiveness of the pier to the purposes cannot be solely responsible, and, when we compare this with what we knew twenty or twenty-five years ago, we feel that "the world do move."

It is difficult at the present short perspective of the convention weeks to distinguish and connect cause and effect, so it would perhaps be unwise to say that this completeness of arrangement was the only or perhaps even the main reason for the sedateness and air of businesslike propriety that pervaded everything. But, regardless of the cause, it is certain that those who went out on the pier and made the most of the opportunities afforded, came away with a feeling of the completeness of what they had seen, and an admiration for the executive capacity that could arrange such an exhibition for ten days only, and hold everyone so closely in line that there was neither a delay in installation nor any premature haste at departure.

The reports and papers were well up to the front rank in importance. It has been claimed by some enthusiastic admirers of these two associations that they have done the most valuable work of any technical societies of the world. High praise: but certainly great excellence must be attained by any that would equal them.

While it may be said that all the topics offered for discus-

sion were important, the one that undoubtedly stood out pre-eminently with the Master Car Builders, was the car wheel and the allied topics that influence its efficiency and action. A year ago we had absolutely no experimental data regarding the work that the car wheel is called upon to do. During the past twelve months some startling revelations have been made, and there is promise of still further investigations in the coming year, not only of the wheel on the rail, but of the car on the truck, and the interaction of the side bearings. There appears to be some prospect of the ultimate unraveling of those complicated problems of railroad dynamics, the interaction of the wheel and rail, and the stresses put on the draft rigging, which have attracted so much attention and have been so fruitful of discussion for so many years, for the coupler and the wheel are still at the front. It was unfortunate that an overcrowded programme made it necessary to cut out the topical discussions before the Master Car Builders. Not only were the subjects listed of importance, but it is discouraging to those who have prepared discussions to be unable to present them. Although permission to print is granted, it fails to take the place of a personal presentation, and, in one case at least, the assigned speaker was engaged in investigations upon which he would have liked to have obtained suggestions that could be secured in no other way than from a free discussion.

As with the Master Car Builders, so with the Master Mechanics, there were no insignificant subjects, but there were some of more than passing importance. Of these, the superheater and the apprentice stand in the front rank. It is strange that with the success that has come to us from Germany and from our Canadian neighbor, superheat has made so little progress in this country. But the strong presentation of its value that was made at Atlantic City cannot fail to have its effect, and we may expect to see an awakening among our laggard roads as a result.

It will be remembered how the whole convention was brought to its feet, a year ago, by the presentation of an apprenticeship system, and how the subject drove all others aside for two days. Evidently that interest was not mere passing enthusiasm, for, though this year's discussion was not as prolonged as last year, it was none the less earnest, and the exhibit attracted more attention than a little. The methods exploited a year ago must now be regarded as an accepted success in so far as success can be said to attend so young a thing as this latest method of apprenticeship instruction. The doubts as to the advisability of what seemed semi-charity in dealing with young men, have evidently disappeared, at least they received but the mildest of expressions in the discussion, under the positive assertions of the promoters that it was pure commercial self-interest that led to its establishment. But in any work of this kind, the good must bless both the giver and the receiver, and this was well set forth by two speakers, both of whom were interested in the apprenticeship system. One spoke in reply to a suggestion that young men should be left to their own resources and initiative and that thus the fittest would survive. Attention was called to the well-known inability of the young to appreciate the value of specific and special training and that, if they were compelled to take the apprenticeship course, as laid down for them, they would sooner come to realize the utility of such training by the broadened view of things given to them by the increase of knowledge, whereby their usefulness to themselves and the community would be correspondingly increased. The other speaker dwelt upon the necessity for a conservation of our resources and showed that, as we are already experiencing the pinch due to a wastefulness of natural products, we are also having trouble in finding men fitted to meet the requirements of modern service because of the slipshod methods of training that have prevailed in the shop for so many years, and that this apprenticeship system will tend to supply this lack and fill the vacancies due to former carelessness. Certainly these two points are more than worthy of consideration and promise to repay many times the trouble and expense that has been incurred in the training.

THE WORKING OF THE PREMIUM SYSTEM ON THE SANTA FE.

The premium or bonus system of paying shop labor on the Atchison, Topeka & Santa Fe was briefly outlined in the *Railroad Gazette*, Nov. 30, 1906, in an article describing the extensive system of betterment work which was inaugurated on that road in 1904. Since that article was written, the premium system has been extended to all the shops on the Atchison system and to all departments where it could be applied. There are now about 8,000 men working on premium, which is about 62 per cent. of the total shop employees. It is in such high favor with the men that an attempt to withdraw the system, now so firmly established, would doubtless meet with strenuous objection and might precipitate serious labor troubles. As compared with straight piece work, those in immediate charge think that the premium system is as far ahead of piece work as a fair and equitable system as the latter is in advance of day work; that it promotes a labor condition that is far more advantageous to the road than any other wage system in use on railroads. This point of view is interesting, because it is not generally entertained.

One of the greatest advantages of the Santa Fe plan is the basis it furnishes for comparing efficiencies of individuals, of gangs, shops, divisions, and of determining the efficiency of the system as a whole and thus contrasting different periods —a thing impossible to do under any other wage system we know of in railroad shops. This is made possible through the time schedules which are worked out for each job. A standard time is set for doing the job and this gives, at once, a standard unit on which to base output and shop costs. This standard unit is the amount of work that a standard workman does in one hour. By balancing the actual hours a man takes to do his work against the standard hours set by the schedules for doing this work, the man's efficiency is determined. The efficiency of the shop is the ratio of actual hours worked to standard hours or units turned out. If the actual hours equal the standard hours the efficiency is 100 per cent. Individuals often attain efficiencies much higher than 100 per cent. If, for example, a workman does 260 hours work in 225 hours his efficiency is 115 per cent. A great many of the shops show monthly efficiencies between 90 and 100 per cent. and the record of the system for April was an efficiency of 92 per cent., with 62 per cent. of the employees on premium.

Standard time is that which a good man can attain by reasonable attention to his work. For making standard time, a premium of 20 per cent. is paid. For less than standard time, the premium increases above 20 per cent. If more time than standard is taken the bonus diminishes, until at 50 per cent. above standard it merges into day rate. The worker thus makes day wages in any event. The experience on the Santa Fe has been that men starting to work on bonus will often make but a nominal amount above day wages at first. But as they become more adept at working against time and at using their heads to make every move count, they gain facility in the production of work that adds substantially to their month's wages. At the Topeka shops, where the bonus method has been in effect the longest time, the average efficiency of the men is close to 100 per cent., month after month, which means that they are receiving about 20 per cent. above day wages right along. Individuals have earned as high as $80 bonus, and there have been exceptional cases where even more than this was earned.

It will be seen that the guaranteed day wage is a cardinal principle in the Santa Fe method. With piece work or premium work, in which this is absent, if prices are cut the very spirit of intensive production which they are designed to foster is discouraged. A fundamental difference between

piece work and bonus work is that piece work puts a money value on an operation, while bonus work puts a *time* value on the operation. It is easier, therefore, to adjust bonus schedules than to cut piece work prices. The Santa Fe has made it a policy not to cut schedules, however. Any reduction in time a workman is able to effect by exercise of ingenuity he is allowed the full benefit of, even if it yields him abnormally high bonus. As an example of this and the stimulating effect of the method: Before bonus work was installed, a man turning flue roller pins did eight as a fair day's work. When the schedule for this job was made up it was thought this number ought to be increased to 15 for the standard. The workman protested, but the figure was allowed to stand, it being the judgment of those making the time study that it could be attained by proper effort. Thus spurred, the workman set out to "make good," and the final result was astounding. Not only did he soon reach and pass the standard, but he worked up to an output of 60 pins a day! That meant, of course, that he soon worked himself out of this particular job, as there was not an unlimited demand for these pins. At his final rate this man had attained an efficiency of 400 per cent. and earned a bonus of two or three times the amount of his day wages. Instances like this are not uncommon under any system which incites a man to exercise all the ingenuity that is in him to attain the highest possible proficiency, knowing that he will receive the full reward of his efforts, without fear of a reduction. In cases like the foregoing the schedule will be revised, of course, before another man is put on the job. The company reserves the right to change a schedule if any change occurs in man, wage rate, machine, or method of doing the work.

Another important advantage of the bonus plan, as compared to piece work, is that the shorter the time in which a man does a piece of work, the cheaper the product becomes to the company. With piece work, no matter how short the time taken for the work, the cost is the same; the wages paid a piece worker for a month are the price per piece multiplied by the number of pieces for the month. Under bonus work two factors enter into the man's earnings for the month—wages and bonus. Hours worked times hourly rate constitute wages; bonus is the percentage of wages determined by the man's efficiency. The higher this efficiency the higher the bonus paid, yet the lower the total cost for labor. To take a concrete example: for performing 250 hours' work in standard time at 36 cents an hour the wages would be $90, and the bonus of 20 per cent. would make the total $108. This would be 100 per cent. efficiency. At 125 per cent. efficiency the wages would be $72 and the bonus $32.40, or a labor cost of $104.40. At 175 per cent. efficiency the wages become $51.40 and the bonus $48.90, or a total of $100.30. The saving to the company by the 175 per cent. man over the 100 per cent. man is therefore $7.70 in this instance. Furthermore, experience has shown that the quality of work done has improved as the quantity of production has been stimulated. The present condition of the locomotives bears this out. Also it is interesting to know that when, in common with all other railroads, the Santa Fe found it necessary to reduce the working time in its shops on account of the falling off in traffic following the recent business depression, the shop efficiency showed a noticeable increase.

A feature of the Santa Fe system is the method of rewarding the foremen also, in a manner somewhat similar to that for rewarding the men. The plan is more elaborate and complicated, however, and will not be given here. The wisdom of including the foremen in the distribution of rewards for extra effort is obvious. Where they do not thus participate in the premiums many of the men will earn more money than their foremen. This naturally causes more or less dissatisfaction on the part of the latter and weakens their incentive to do more than is necessary simply to hold their jobs. By giving them bonus their enthusiastic co-operation is secured.

NEW PUBLICATIONS.

The Progress of Electric Telpherage. By Prof. Emile Guarini. Paris: H. Dunod & E. Pinot. 24 pages; 6¼ x 9¾ in.; 43 illustrations. Price, paper, 2 francs.

Telpherage is the transportation of materials on a track which is usually overhead. This may be a cable, steel girder or a stringer with T rail, supported by poles, towers, bents or the sides of buildings. In electric telpherage, the moving machinery consists of the telpher, which carries the motor, the trailers, the portable electric hoist and the load carriers. The book, which is in English, describes the five forms of track construction, three of which use the T rail, one using the so-called bulb angle or deck beam, and one the cable. The descriptions are accompanied by a number of half-tone and line illustrations of installations in operation in various parts of the United States.

Autogenous Welding of Metals. By L. L. Bernier, M.E. New York: The Boiler Maker. 45 pages, 4½ x 6½ in.; 32 illustrations. Price, paper, $1.00.

This book consists of translations from reports of the National School of Arts and Trades of France, being, according to the preface, "a description of the application of autogenous welding to the manufacture of tanks, gasometers, receptacles for liquids or gases with or without pressure; steam and hot water boilers, kettles, small boats, automobiles; piping, either steel, copper or brass, and coils of all kinds; and also its application to repairing old or new castings injured through such defects as blow-holes, cracks, etc.," also, "its application to the manufacture of steel, brass, bars and plates, and to the destruction of metals, structures, etc." This process of welding iron, steel, copper, brass and aluminum castings and forgings, by the use of a small flame of oxygen and acetylene, fed to a torch under pressure, is thoroughly described. Temperatures of from 4,000 deg. to 6,000 deg. Fahr. are obtained. The flame being concentrated to a very small area, an efficient weld results. These reports discuss fully the oxyacetylene process, giving its cost and application in connection with the use of high temperatures for industrial purposes obtained by burners.

Gould Railroad Lines. By Charles F. Speare. Reprinted from The *Evening Mail*. 43 pages. Price, 15 cents.

Mr. Speare was sent by the *Evening Mail* (New York) to make a trip of inspection over the main lines of the Gould system, this inspection covering about 5,000 miles. He found the roads in better physical condition, he says, than is generally believed in the East. The Texas & Pacific has been nearly rebuilt from its own earnings during the last 10 years, and in the Denver & Rio Grande he finds a mountain road economically operated. Like a man who is writing a biography of his favorite statesman, Mr. Speare is inclined to be enthusiastic in his judgment.

Letters to the Editor.

THE TEXAS COMMISSION.

4708 McPherson Avenue, St. Louis, June 5, 1908.

To the Editor of the Railroad Age Gazette:

If the newspapers report the Texas Railroad Commission correctly, I wonder how that body reconciles its attitude of opposition to any increase in rates to overcome the large decrease in net earnings of Texas lines recently reported, on the grounds of the decrease being due to the general business depression, of which the railroads as well as the merchant and planter should bear their share, with its air of paternity for the planter and merchant as exemplified by rate reductions when railroads appear to be making an "unreasonable profit" in prosperous times. It seems the planter and the merchant may make all the profit possible at any time, but the railroads may at no time make more than a "reasonable" profit and in times of depression must bear a share of the general loss.

The theory of control of rates being governed by net earnings of railroads, necessarily implies cost of service as the basis for determining rates; in a prosperous year when a large volume of traffic is moving, the general assumption is

that the cost of transportation is less per unit, and the commission at once becomes useful in reducing rates accordingly; the lean year being with us, however, and a smaller volume of traffic moving, the cost per unit of transportation increases accordingly, but the commission's field of usefulness suddenly changes; last year they said, "It's heads now, you don't win"; this year they say, "It's tails now, you lose."

Truly a wonderful platform for re-election. Truly a wonderful state for the planter—for a brief year or two. But we fear the Texas planter will find his investment as firmly fixed as the victim's; as was that of the Wisconsin planter, who was handed the same gold brick in 1874 by the legislature of his state.

F. M. SWACKER.

INCREASED OPERATING COSTS.

Richmond, Va., June 9, 1908.

TO THE EDITOR OF THE RAILROAD AGE GAZETTE:

In my letter of May 28, which appeared in your issue of June 5, I said that it looked as if the economic effect of heavier train loads was being neutralized by the increased cost of operation and interest on additional cost of road and equipment. I have been making further comparisons of the statistics furnished by the Interstate Commerce Commission for 1906 and 1901 to ascertain if possible whether such is really the case. The economy heretofore effected was by an increase in the average train load without a corresponding increase in the cost of movement per train-mile. The following statement shows that the cost of movement increased from 39.60 cents per train-mile in 1901 to 52.31 cents in 1906, or 32.1 per cent.; while (as appears from my previous statement) the number of passengers per passenger train increased only 16.66 per cent., and the number of tons per freight train increased only 22.45 per cent. during the same period.

Relative Cost of Movement of Revenue Trains in 1901 *and* 1906 *as Shown by the Reports of the Interstate Commerce Commission.*

	1901.	1906.
Revenue train Miles	908,092,818	1,105,877,091
Maintenance of machinery:		
Repairs and renewals of locomotives.	$66,253,484	$123,893,482
Proportional charge for superintendence	190,563	225,766
Proportional charge for repairs of machinery and tools	194,332	320,103
Total for Maint. of locomotives	$66,638,379	$124,439,351
Conducting transportation:		
Engine and roundhouse men	$92,439,343	$142,230,807
Fuel for locomotives	104,926,568	170,499,133
Water supply for locomotives	6,051,801	9,964,616
Oil, tallow and waste for locomotives	3,570,044	5,903,014
Other supplies for locomotives	2,037,823	3,827,547
Total cost of motive power	$275,663,958	$456,864,468
Train service	69,390,004	97,757,296
Train supplies and expenses	14,560,788	23,871,258
Total cost of movement	$359,614,730	$578,493,022
Cost per revenue train-mile	*39.60	*52.31

*Cents.

Note.—Increase in cost of movement per revenue train-mile, 32.1 per cent.

I think this shows conclusively that the cost of movement per train-mile has not only increased at a greater ratio than the increase in train loads, but it has reached the point where the cost of hauling freight per ton-mile is increasing instead of decreasing as heretofore.

The cost of movement as compared with the total cost of operating per train-mile for 1901 and 1906 was as follows:

	Cents.	
	1901.	1906.
Total cost	112.29	137.06
Cost of movement	39.60	52.31
Other expenses	72.69	84.75

This shows that the cost of movement has increased 32.1 per cent., and other expenses per train-mile, including cost of maintenance, have increased 16.59 per cent., making an increase in the total cost of all trains per train-mile of 22.06 per cent. If, as appears from the above, the continued efforts of the railroads to cheapen the cost of handling traffic by means of heavier train loads, are being thwarted by the increased cost of labor and supplies, they must, under pressure of present conditions, resort to direct means of reducing the cost of operation, such as reduction in wages and taking off trains, or advance rates until the return of better times.

It is true that for a time they can effect some saving by putting off expenditures for maintenance, but that is a temporary expedient, inconsistent with true economy, and cannot be continued for more than a year or two at farthest. It would be justified only by the hope of a speedy revival of commerce, for which there is no precedent; for the last period of depression in business, according to the Interstate Commerce Commission, as stated in report for 1897, page 61, lasted from June, 1893, to June, 1897, and what reason have we for expecting a permanent revival in business in less time, after so severe a panic as that of October, 1907, which has already decreased traffic more than it was curtailed by the panic of 1893?

The problem the railroads are facing to-day is how to render safe and adequate service to the public, and keep up their properties on returns from greatly reduced traffic until such time as business revives; and the question is, can this be done without higher rates?

T. M. R. TALCOTT,
General Manager Tidewater & Western Railroad.

ACCOUNTING DEPRECIATION.

TO THE EDITOR OF THE RAILROAD AGE GAZETTE:

The ground has been pretty fully covered, in so far as equipment is concerned, and that is the only part of railroad property yet seriously considered. The Interstate Commerce Commission started it, and took hold of equipment because, I presume, it looked easy. No doubt it is easier to calculate depreciation on equipment than on any other part of railroad property, but from the different arguments which have been sent to the commissioners within the last 12 months they must have come to the conclusion it was not so easy as it looked. There is no reason why the same principles of accounting should not apply to other kinds of railroad property, and when they get to buildings, bridges and permanent way, they will find it much more difficult.

The purpose of the commission is to maintain the integrity of accounts and published statements, and if the commissioners insist upon provision being made for depreciation, they should also insist upon proper report being made of appreciation; otherwise, they will not arrive at the integrity so desired, and both the public and security holders can be just as easily misled by one omission as the other. There has been a great deal of talk about over capitalization of railroads, and it has been suggested that a physical valuation of their property should be made in order to prove this. I am informed that a competent commission was recently appointed to make a physical valuation of the property of the Lake Shore & Michigan Southern Railroad. The commission commenced at Chicago, working east from there. Their figures show that when they had arrived approximately half way between Toledo and Cleveland they had found more value than was represented by the par of all stocks and bonds now outstanding.

The tax commission of Oklahoma recently made an appraisal of the main lines of railroad within that state ,and reported the valuation of one at $42,000 per mile, of another at $40,000 per mile, and of another at $45,000 per mile. The particular mileage valued is below the average of the entire lines of any of thees companies, including no large terminals. Taking this into consideration, and also allowing for equipment, there is no doubt that a fair valuation would produce an amount largely in excess of the total capitalization, and I believe this same result would be found on practically every road in the United States.

What does it mean? It must mean that while depreciation has occurred in some kinds of railroad property, other kinds have increased in value to a much larger degree; therefore, an arbitrary order for annual valuations of certain portions only of railroad property would leave the investor, if anything, farther away from the truth, or the actual facts, than he is to-day. If periodical valuations are to be made for the benefit of the investor, or the public, they should cover the entire property owned by the railroad, and not a very small part of it, which everybody knows must depreciate from year to year.

It is true that annual reports of railroad companies have been heretofore made under policies so different that no accurate comparison of the securities, by investors, could be

made. Prices of securities, however, have not been made upon the figures shown in these reports. To a very large extent they have been made upon the reputation of those in control. This can readily be proven by examination of the New York stock list. Securities can be found selling at practically the same figure which return to the investor rates of interest varying all the way between 4 and 6, or even 7 per cent. The difference is due to the manner in which the public believes the properties are handled.

Is there any remedy for this? Can the government issue orders providing that every railroad corporation shall be managed in exactly the same way; the same percentage of earnings used in maintenance of way, the same percentage of earnings used in maintenance of equipment, and the same percentage used in additions, betterments or development of the property? If they have that power, then are they competent to supervise such an arrangement?

No one doubts but that if some formula could be devised by which annual statements of railroad companies were made upon identically the same basis, the savings of the public would be used much more freely in the purchase of railroad securities. This would be a consummation devoutly to be wished. Our prosperity is largely dependent upon railroad facilities, and anything which would aid their development is certainly worth seeking for. COMPTROLLER.

RESPONSIBILITY IN THE MATTER OF RATE QUOTATIONS.

Pittsburgh, Pa., June 10, 1908.

To the Editor of the Railroad Age Gazette:

It is reported that the Interstate Commerce Commission is in receipt of hundreds of letters complaining because the responsibility of ascertaining the correctness of quotations of rates is by law placed on the shipper instead of on the railroads. The object of this is clear and it has been the means of preventing to a great extent the practice of rebating. If the railroads should now be held responsible for their quotations much of the good that has been accomplished would be lost. It is easy to make mistakes and difficult to prove that they were wilfully made. The shippers who clamor for railroad responsibility should bear in mind that they are asking for what might work to their disadvantage as well as advantage, because a competitor could just as easily as they gain the confidence of the railroad and get a quotation of a rate less than the legal rate. In some cases competition is so keen that any methods will be used to swell traffic and business.

The objections to the law as it stands seem to have arisen mainly from the fact that the public cannot understand the so-called complicated tariffs of the carriers. As a rule, railroad tariffs are not complicated, and by a careful study can be read with precision in most instances. It is a great advantage to have on file the railroads' tariffs covering the commodities which are handled in your business. I am with an industrial corporation, and this company, realizing its responsibility and the advantage of having the carriers' tariffs on file, carries a complete line issued by the railroads entering its different plants, working with the three different classifications. Keeping these tariffs to date and ascertaining rates therefrom, does not require the entire daily services of one man, so it can be seen that the idea of having to have one or more men to keep the tariffs up for an ordinary sized concern is entirely erroneous. Little time would be required to meet the small shippers' needs; and they seem to be the chief complainants.

We do detect some errors in quotations and experience some difficulty with the railroads in our daily business, but I cannot say that we have much trouble either in obtaining tariffs or having points explained which are not entirely clear, one reason for which, I think, is that we do not desist from asking questions until every matter has been settled to our entire satisfaction. When we show that the point has to be made clear, there seems to be no difficulty in getting at the bottom of the trouble.

Railroad men are the only people who can enlighten the public in matters of this kind, and they do not always do so satisfactorily. To improve such service, the railroads could establish a "Rate Information Bureau" to be in the general freight department, and if possible have the rate clerks work in harmony with the bureau. The general freight department is supposed to give any information regarding rates, but it should have agents to work among the different industries and shippers, making it clear that they are there to give advice pertaining to traffic questions and rates, and that they are working for the interest of the public. If it is not desirable that such a bureau be established, or such agents appointed, the fact should be forced on the railroads' attention that they must give the public more consideration than at present. One reason why you get curt or short answers from rate clerks is that in the discharge of their multitudinous duties, brevity becomes an important factor, but sometimes to the dissatisfaction of the public. However, if you make your wants known, you can generally obtain what information you are after.

As a rule, the rate clerks perform their duties in a satistory manner. On more than one occasion I have been told by them that many of their inquiries by telephone are made by people, who, after evidently turning the information they receive over in their minds several times, start on a new line or seek more information, but to their chagrin do not always find the rate clerk on the other end of the line, simply because he has not time to wait. I know I have often resented the short answers given by rate clerks, but after becoming acquainted with them, or having the error of my ways pointed out, I have found I was generally in the wrong and made it a point to know what I wanted before I made any inquiries, and then persisted until I got a full answer to all my questions. I believe the soliciting departments of each road in each city, and especially of a road having its own line in a city, should have agents to find out their customers' wants and send them unsolicited tariffs and a competent person to explain the tariffs. This would be the means of promoting a better feeling between the railroad and the public.

F. M. G.

BRAKE EFFICIENCY IN THE WRECK AT SHREWSBURY

York, England, June 1, 1908.

To the Editor of the Railroad Age Gazette:

Referring to Arthur M. Waitt's letter under date of April 2, and published in the issue of the *Railway Age* of April 10, I quite agree with his view that what may be called "full dress rehearsals" with the apparatus specially prepared and all the staff conducting the experiments picked men may give results which are better than the average likely to be obtained in every-day working. It was this feeling which prompted our chief mechanical engineer and myself to conduct some further experiments about 12 months after those which took place in 1903 and about which Mr. Waitt evidently knows. On the second occasion we, without any previous warning to anyone, withdrew a train of 40-ton coal wagons fitted with the vacuum brake out of traffic, attached to them an engine which had not been specially prepared, and made very much the same trials as had been made on the previous occasion.

We were agreeably surprised to find that the vacuum brake was as efficient under these conditions as it had been on the previous trials, and there was not that amount of deterioration which one might almost have expected, seeing that the apparatus had been exposed to very severe working conditions in the haulage of coal with a large amount of dust in it to high level shipping stages in a most exposed position on the northeast coast.

With regard to the non-adoption in Great Britain of the latest type of the Westinghouse brake, viz., "High speed," I can assure Mr. Waitt and any others who are interested in the matter that it is not due to a failure to investigate the question or to appreciate the merits of the invention that no passenger trains in this country are fitted with it. My company for one has given the matter full and careful consideration, and we have come to the deliberate opinion that in view of the immunity from accident with which our passenger traffic is handled, due largely to the intervals between trains which our system of absolute block working involves, and the good results we obtain from the "quick-acting" Westing-

house brake, the cost of adopting the "high-speed" Westinghouse is out of proportion to the benefits to be obtained from it. In my opinion there are reasons for the American railroads going to the expense of adopting the "high-speed" Westinghouse brake which do not apply in Great Britain.

I should be the last to deny that there are some patterns of vacuum brake apparatus in use in this country which are not of the most up-to-date type, but that is to my mind a comparatively unimportant matter. In my opinion the real question at issue is whether the principle of the vacuum brake, assuming that the most up-to-date type is used, is equally capable of averting collisions as compared with the principle of the Westinghouse brake, assuming the most up-to-date type is used. In stating the proposition this way one of course must assume that both systems are efficiently maintained. One may be more costly to maintain than the other, but that again to my mind is of secondary importance especially when the situation is one such as exists in Great Britain where the cost to the railroad companies of changing from vacuum to Westinghouse would be so enormous. Personally, I am of opinion the man who contends that the Westinghouse brake ought to be universally adopted in Great Britain has a very difficult case to establish.

It may interest your readers to know that it is the intention of the British railroad companies to satisfy themselves whether there is anything in the criticisms of the vacuum brake which have appeared during the last two years in the public prints.

I am obliged to Mr. Waitt for his answer to my question as to how experiments could be safely carried out to test the effect of centrifugal force on the older forms of ball valve.

If Mr. Waitt has failed to find evidence of progress on the brake question in Great Britain during the last 10 years it is not because of a tendency to be satisfied with old standards as he suggests, and I feel bound to dissent altogether from the conclusion which might be drawn from the statement of fact made by him and which (I know I am on delicate ground in drawing inferences) I think he intends his readers to draw.

I realize that the width of the Atlantic puts difficulties in the way of obtaining evidence of progress, and it may also be that the railroad companies and the technical press of this country have not given sufficient prominence to the work done towards brake improvement in the last decade, but there is ample evidence to show that the brake problem has been receiving a large amount of attention from experts.

After all, while it is true that there have been a large number of imputations against the efficiency of the vacuum brake it is equally true that the number of fully proved cases is very small indeed.

H. A. WATSON,
General Superintendent, North Eastern Railway.

TELEPHONES IN RAILROAD OPERATION.

BY W. E. HARKNESS.*

About 20,000 telephones are now in use by the railroads of the United States, which is about three times the number in use seven years ago. In offices of the Pennsylvania Railroad, including all of the lines controlled by the company east of Pittsburgh, there are now over 10,000 telephones. The company has contracted for over 900,000 trunk calls with telephone companies. The road has 150 telephone switchboards.

Private branch exchanges maintained by the railroads usually do a larger volume of business than those in other commercial lines. A study of 100 private branch exchanges shows that in the number of calls the railroad exchanges made or received 175 to 100 at exchanges in other lines of business.

Among the most important uses of the telephone in railroad service are the securing of sleeping car berths and the prompt notification of consignees of the arrival of freight. Where there are several ticket offices in a single city, telephone connection between them promotes economy in the use of sleeping car space. If a freight agent can have telephones to all parts of his freight house, so that he can give prompt and satisfactory answers to consignees who inquire whether or not their freight has arrived, he can so facilitate the delivery of freight as to save warehouse room.

*From a copyrighted paper read before the New York Telephone Society.

Public pay stations in railroad stations are now a great convenience to the public. At Broad Street Station, Philadelphia, there are now two such stations; one in the main waiting room, with 10 employees and 11 booths, and one in the ladies' waiting room, with two operators and five booths. Over 200 railroads are now using telephones for train despatching. [This includes a large number of roads on which the volume of traffic is so small that train despatching is only a minor incident.—EDITOR.] The Lake Erie, Alliance & Wheeling, operating 100 miles of line, has used the telephone exclusively for despatching for some years. This road is operated by the Lake Shore & Michigan Southern. It moves 30 trains each way daily, and there are 24 telephone stations, all connected to a single line. The stations are called by a code of bell signals. The Pennsylvania has used telephones on its freight line between Columbia and Parkesburg, 38 miles, for nearly two years. At each terminal of this division and at three intermediate points small cordless switchboards are located, to which are connected three classes of telephone circuits. One of these is called the Train Director's Wire. This is a through circuit connected permanently into each of the five switchboards. Another circuit known as the Long Distance Emergency Wire connects the switchboard at each end station with the one at the center of the division only. The switchboards are also connected by lines extending from switchboard to switchboard, and to these lines are connected some 25 telephone stations fixed in booths at various points along the track. These lines are known as the Block Wires.

The Train Director is at one end of the division and by means of the Train Director's wire can speak with the operators at the various switchboards and through them be connected to telephone stations on the Block Wire in either direction and in this way get in direct communication with the train crews.

In receiving train orders by telephone, conductors and enginemen are required to go to the telephone, one to receive and repeat the order while the other one writes it down. After it has been received the one who writes it from the other's repetition must repeat it back while the one who received it must underline each word as it is repeated, in this way giving a check on the order and ensuring the correct understanding of the order by both parties concerned. Regular carbon backed printed forms are provided in each booth for the writing of the orders so that a uniform method is used and a sufficient number of copies made.

The New York Central has for nine months used the telephone for transmitting train orders on its four-track line between Albany, N. Y., and Fonda, 40 miles, and there have been no interruptions to the telephone service. The line used is a metallic circuit of 210-lb. copper wire and connection is established with 16 stations along the section. Signaling devices are used on this circuit by which the despatcher at Albany can call any one station without calling the others, or while talking to one station he may call another without interfering with the conversation. These selectors are operated by a relay of low impedance connected in series with the line, and are arranged to close a local bell circuit when operated by a combination of electrical impulses sent out over the circuit by the despatcher. The despatcher is furnished with a set of automatic calling keys, one for each station on the line, so arranged that the proper combination of impulses will be sent out over the line to operate the various selectors.

The selecting current, supplied by a grounded battery located at the despatcher's office, is applied to the neutral point of a bridged impedance coil and the current is completed to ground at the distant end of the line through another impedance coil similarly connected. In this way stations can be called while a conversation is being held on the line without interference from the signaling current impulses. The stations on one side of the circuit may be signaled in case one side of the line should open and conversation can even be carried on with the stations with the line in this condition. Thus even though the line may be in trouble, conversation can be carried on over a line which if used for telegraph would be entirely out of service.

The selection of any station is done in about eight seconds and the local bell circuit closed by the selector remains closed until the operator answers the call by closing a key. The arrangements are such that the despatcher receives an auto-

matic answer back signal from the station called. This signal is given by the bell at the station so that if the answer back is received by the despatcher there can be no question as to the ringing of the bell at the station.

The despatcher is equipped with a chest transmitter and a head telephone. The transmitter circuit is normally open and his receiver is bridged across the line at all times. In this way he can be reached instantaneously by any operator coming in on the line. A key for closing the transmitter circuit is provided and also one to connect a howler signaling circuit to the line. This latter is used when stations fail to disconnect their sets from the line after finishing their conversation.

The stations are equipped with special telephone sets consisting of a special desk arm to which is secured a special hand set, somewhat similar to the one used by telephone linemen, together with the usual induction coil and batteries. A key for closing the transmitter circuit is also provided. The special equipment was necessary owing to the fact that the operators in the stations were obliged to attend to the switches and signals and to do this properly should not be obliged to have to bother with a head telephone. Further, by having the relative positions of the transmitter and receiver fixed, it was believed that better transmission would be obtained as the operator is obliged to hold his ear to the receiver to receive his orders, and when in this position he has the transmitter directly in front of him. The despatcher calls the various stations desired by operating the automatic keys and as each man answers his call he is told to prepare to take an order. The order is then given by the despatcher word by word and written out by the operators. The despatcher writes the order word for word as he issues it to the operators and in this way prevents too rapid dictation and ensures the accuracy of his own record. It is then repeated back by each operator and as each word is repeated back the despatcher underscores it in his book. The underscoring is done each time the order is repeated by the different operators so that if the order is issued to three operators and properly repeated by them, each word in the despatcher's book will be underscored three times.

The check on telegraphic train orders is usually done by an operator other than the despatcher who copies all the orders as given by the despatcher and repeated by each operator. The New York Central equipment has been subject to careful observation by the officers of the road, and it has been found that the despatcher operating this circuit is busy about 55 per cent. of his time while the other despatchers handling the same trains on the remaining sections of the same division are kept busy all of the time. This, however, is not the greatest advantage of the system. It has been found that the despatchers and the operators are in closer touch with each other on the telephone circuit and assume more personal relations, so that more detailed information regarding the movement of trains is transmitted when conversing by telephone than was possible by telegraph. The number of small matters which are called to the attention of the despatcher affecting the movement of trains can be taken care of instantaneously and instructions issued as quickly as the information is received. If necessary the conductor of the train or the engineman can be called to the telephone and the details of existing conditions received at first hand rather than through an operator. It further permits of the superintendent of the division, or higher officials, to talk with the man on the ground, in case of accident or unusual delay, and issue instructions if necessary. The telephone circuit has been found to operate under all conditions of weather which ordinarily would interfere with the operation of a telegraph circuit.

The amount of money which it is possible to save in this way cannot be estimated, but it is greatly in excess of the cost of the telephone line and equipment necessary to accomplish these results.

The Chicago, Burlington & Quincy during the early part of this year installed the telephone for despatching service on its main line between Aurora and Mendota, 46 miles; Aurora and Chicago, 37 miles, and between Aurora and Savannah, 108 miles, in all about 191 miles.

The method of wording and issuing the orders on these circuits is practically the same as that used on the New York Central, but the method of selective signaling and the apparatus used is quite different.

Each station is equipped with a special transmitter arm and head telephone with the necessary induction coil and batteries. A high resistance and high impedance relay is bridged across the line at each station, and there is a selective device consisting of a clock work on which is mounted a commutator having two narrow segments diametrically opposite each other. These segments are connected together and form part of the circuit of a locking relay controlling the signal bell. The circuit of this locking relay is completed through a brush resting on the surface of the commutator, which momentarily makes contact with one of the segments during each half revolution of the commutator, and also the contacts of the bridged line relay.

The clock work is prevented from running continuously by a stop which is electrically controlled. The stop or starting relay, as it may be called, is controlled by the relay bridged across the telephone circuit and is operated when an impulse of current is sent out over the line by the despatcher.

The mechanical arrangements are such that after the clock work has been released and starts to run the commutator is permitted to make a half revolution. The continued operation being prevented by a mechanical stop and the mechanism is again ready for the next call. By this arrangement the direction of rotation of the commutator is always the same, no reversal being necessary to restore it to normal.

The half revolution of the commutator is completed in 30 seconds, and by locating the segments on the commutators at the various stations at different points on the circumference it is possible to have the local circuit of the various stations closed in successive order, or according to any prearranged plan.

At the despatcher's office a master clock is installed which differs from those at the stations in that its commutator contains 30 segments on each half, or a total of 60, the ones diametrically opposite being connected in multiple. This commutator is stationary and contact is established with the segments by means of a revolving brush. The motion of this brush is controlled in the same manner as the commutators at the stations, and during a half revolution it makes contact consecutively with each of the 30 segments on the commutator and then comes to rest and is ready for the next call.

Each of the 30 segments on the commutator of the master clock is connected to one contact of an individual key, the other contact of the key being connected to the winding of a local relay, its circuit being completed through the brush of the master clock. When operated this relay sends an electrical impulse out over the telephone line.

Thus 30 individual keys are provided, one for each station. These keys when depressed are mechanically locked and are arranged so that when the master clock comes to rest after making a call, all of the keys which have been locked are released and restored to normal.

The despatcher is also furnished with a starting key which when depressed sends an impulse of current out over the telephone line and starts the master clock and all of the station clocks; and these continue to run for 30 seconds, being then stopped mechanically as previously mentioned.

To signal or select a station the despatcher depresses the individual key associated with the particular station desired and then starts the clocks by pressing the starting key. As the brush on the master clock passes over the segments on the commutator, and when in contact with the one connected to the station key which has been depressed, it completes the circuit of the local relay, sending a second impulse of current out over the line. At the instant this second impulse of current is applied to the line the brush and segment of the particular station desired are in contact and the locking relay controlling the signal bell being operated by the bridged line relay causes the bell to ring, which continues until the relay is released by the station operator pressing a key.

No "Answer back" signal is given to the despatcher so that he is unable to tell whether or not the signal has been received until the operator answers.

This arrangement permits of more than one station being called at practically the same time, in fact it is possible to call all of the stations, if so desired, in the 30 seconds. The average time for an equipment of 30 stations would be 15

seconds, which is greater than that of the system used by the New York Central. Further, while some stations can be called in three or four seconds, it will require 26 or 28 seconds to call others.

The great advantage claimed for the system used by the Burlington is the calling arrangement, which permits one or all of the stations being called in one operation by the despatcher. This is not so important as might be imagined, however, as it is seldom necessary to call all of the stations, three or four being the usual number. As it takes from one to five minutes to raise a single station by telegraph and since with a selective device it is possible to call, say three stations in 24 seconds, it is so great an improvement over the old method that a further gain of a few seconds is not of any great importance.

The multiple calling has a further disadvantage in that two or more operators are liable to come in on the circuit at the same time and break in on the conversation and cause confusion similar to that produced by telephone operators breaking in on a call circuit, and in straightening out a situation of this kind more time is lost than is gained by calling several stations at the same time.

The New York Central system, taking eight seconds for calling each station, permits the despatcher to call one station, and while instructing the operator at the first station to prepare to take an order, call the second station, and while instructing the second operator call the third, the whole transaction taking about 24 seconds without confusion.

So far all of the telephone apparatus furnished for despatching purposes has been special and the indications are that this will continue for some time to come, as each railroad man has ideas of his own which he naturally thinks are the best and which he will insist on trying.

In addition to the roads mentioned as actually despatching by telephone the following large roads are installing telephone despatching apparatus:

Illinois Central.	Chicago, Milwaukee & St. Paul.
Lake Shore & Michigan Southern	Chicago & North-Western.
Canadian Pacific.	Northern Pacific.

Other roads are making investigations of telephone despatching, namely, the

Delaware, Lackawanna & Western.	Delaware & Hudson.
Erie.	Queen & Crescent.
Baltimore & Ohio.	Pennsylvania.
Seaboard Air Line.	Michigan Central.
Southern.	Union Pacific.

The *Official Railway Guide* shows that of some 1,100 railroads operating 257,000 miles of lines, 213 roads, or 19 per cent., are operating their lines by telephone and have no telegraph connections whatever. The total mileage of these roads is 17,358, or 6¾ per cent. of the total railroad mileage.

Block Signaling.—The usual method of communication between block signal towers is by means of telegraph or bell signals. Some roads are using the telephone for this purpose and have found it superior to either the telegraph or bell signals as it enables more detailed information to be passed between the adjacent towers and movements of trains effected which was not possible under the old systems.

Of the 100 railroads using block signals 77 are using the telegraph, 16 the telephone and 10 bell signals. The largest user of the telephone for this purpose is the Atchison, Topeka & Santa Fe, which operates block signals on 1,400 miles of line by telephone exclusively. The Burlington is operating some 1,100 miles and the Illinois Central about 800 miles of line in the same way.

At Altoona, one of the largest division points on the Pennsylvania Railroad, 525 telephones have been installed by the railroad company in the residences of their trainmen. These sets are connected four on a line and are handled by one operator at the company's private branch exchange. This installation does the work of 15 call boys and has been found more satisfactory in every way and also more economical. Some roads have portable telephone sets on their wrecking trains so that connection may be established with telephone circuits along the line, or if these are not available with composited telegraph lines.

Composite circuits are now in use to a considerable extent. The telephones are connected to existing telegraph circuits without interfering with the operation of the telegraph and without the latter interfering to any great extent with the telephone service. In this way a fair grade of telephone service can be rendered at a small expense for equipment, and as appears from past experience, this leads to a demand for better service and equipment. In this railroad composite service the signaling is done by means of an alternating current of high frequency generated by a vibrator and induction coil in the set. This induction coil is also used for transmission purposes. The signal receiving device, or "howler," consists of a special high-resistance telephone receiver, equipped with a resonating horn, to amplify the sound caused by the vibration of the diaphragm responding to the high frequency signaling current coming over the line from the calling station. The intermediate telegraph stations on composited lines are equipped with a special one micro-farad condenser and a 1,000 ohm non-inductive resistance. The condenser is bridged around the relay and key so that telephonic transmission will not be interrupted when the telegraph key is operated. It also offers a path of low impedance for the high frequency signaling current and prevents the operation of the telegraph relay being affected by this current. The non-inductive resistance is bridged across the terminals of the telegraph relay to prevent the discharge of the condenser or the high frequency signaling current affecting the operation of the relay. An impedance coil and condenser are necessary at the terminal telephone stations to reduce the interference from the telegraph impulses. There are several thousand of these sets in use principally in the middle and extreme west, where stations are far apart and the cost of constructing telephone lines would be correspondingly high. Portable sets for use on trains, to establish communication with the nearest station at any point along the line, are used extensively by some of the large western roads, one being carried on every train. A jointed pole is used to reach the line wire. In general 100 miles of No. 8 iron and 200 miles of No. 12 copper may be taken as the limit of composite service.

The New York Central and the Lake Shore have a through metallic circuit telephone line from New York to Chicago. This line is used in sections between main points as for instance New York and Albany, Albany and Buffalo, Buffalo and Cleveland, etc., for service between division offices, and is connected straight through when a New York-Chicago connection is desired. The Illinois Central has a similar line from Chicago to New Orleans used in the same general way. The Pennsylvania Lines have their own long distance telephone lines between important points.

As a temporary means of securing this long distance service many roads are compositing their copper duplex or quadruplex telegraph wires, and in this way obtaining first class telephone service at a small expense. The Union Pacific has recently composited two duplex wires for this purpose between Omaha and Cheyenne, 500 miles, and is obtaining excellent service. In addition to using this telephone circuit for conversation they are sending messages which were formerly sent by telegraph, operators being assigned at each end to send and receive messages by telephone. The Canadian Pacific has composited a circuit from Montreal to Winnipeg, 1,430 miles, with intermediate telephone stations at Fort William and North Bay. On the Pennsylvania Lines are a number of duplex and quadruplex circuits are composited to obtain additional telephone facilities.

One of the problems is that of the relative merits of leasing or owning the telephone equipment. There are advantages and disadvantages to both schemes, both from the standpoint of the railroad and from that of the operating telephone company. Under present conditions the railroads can obtain at reasonable cost apparatus of the same kind and quality as that now being leased. The larger roads are supervising their service with great care and are in many cases maintaining their equipment. There are over 100 private exchange switchboards and nearly 5,300 leased telephone stations which are now being maintained by railroad companies, and these are apparently rendering service satisfactory to the telephone companies. All of the larger railroads have in their employ capable telephone men who look after their service and maintain their plant, and those who are planning to extend their telephone systems are inquiring for men with telephone experience.

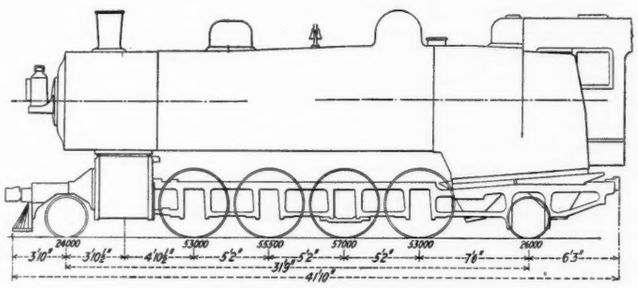
MIKADO LOCOMOTIVE FOR THE VIRGINIAN RAILWAY.

The Virginian Railway, formerly the Tidewater and the Deepwater Railroads, is nearly finished, and work is in progress on the locomotives that will be required for the various kinds of service. Of these there will be four: The main line from the Princeton assembling and classification yards to the sea; pusher service on grades; gathering originating freight on the Deepwater section between Princeton and Deepwater; and the operation of the branch lines or spurs running from the Deepwater division out to the mines. The exact types of locomotives that will be used on pusher work and on the main line for hauling the 80-car trains have not yet been fully decided. For the spur lines running to the mines, it is probable that a Shay locomotive will be used because it can work on grades and curves that would be impossible for the ordinary locomotive. For gathering and distributing cars and hauling to the Princeton yard, a Mikado (2-8-2) locomotive has been designed. This engine will have 24-in. x 32-in. cylinders, 219,000 lbs. on driving wheels, and a maximum tractive effort of 50,350 lbs.

As in the case of the steel coal car designed for the same road and illustrated in our issue of June 12, this engine embodies a number of special features, many being decided novelties and departures from ordinary practice, which are intended to overcome some current locomotive troubles or to adapt the machine to the peculiar and exacting service that will be demanded of it.

The use of the cylinder and half saddle with a double bar frame has been the standard practice on American roads for a number of years, having superseded the previous practice of casting the cylinders and saddles separately. Recently, however, the old method of using two cylinders with a separate saddle has been revived but of a different design from that originally used. This revival was partly because of the great expense involved in case of an accident to a cylinder and partly because of the difficulty of casting and fastening. Instead of the double bar frame of the later designs or the single bar of the earlier, a slab frame has been used at the point of cylinder attachment. Some troubles have developed with this style of cylinder, however, that have made it difficult to hold, while cracks have appeared at various places in the castings, probably due to the stresses set up by the heat of the steam in the passages causing an expansion that is resisted by the frames and the heavier portions of the casting. It is to overcome these difficulties of holding the cylinder, and the dangers of cracking due to expansion, that the design used in this engine of the Virginian Railway has been worked out and which embodies the most radical departure from current or past practice that has been evolved for some time.

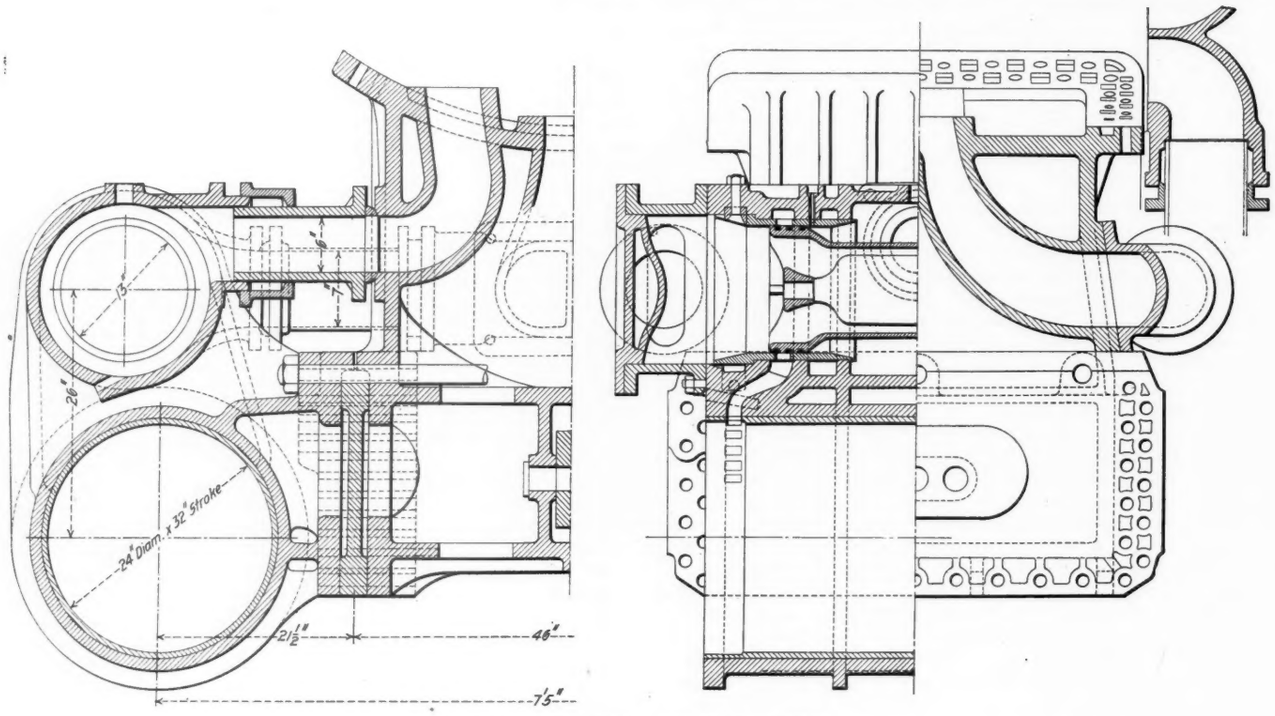
As already mentioned, the cylinders have a diameter of 24 in. with a piston stroke of 32 in. It seems to have been pretty well demonstrated that where heavy masses of metal are pierced by steam passages, the inequalities of expansion will either cause the fastenings to become loose or the castings to crack. In fact, in one instance where there was a great deal of trouble with cracking saddles and loose cylinders, a remedy was found by so changing the passages that a relief from this inequality of expansion was accompanied by a corresponding relief from cracking and loosening. This



Outline of Mikado Locomotive; Virginian Railway.

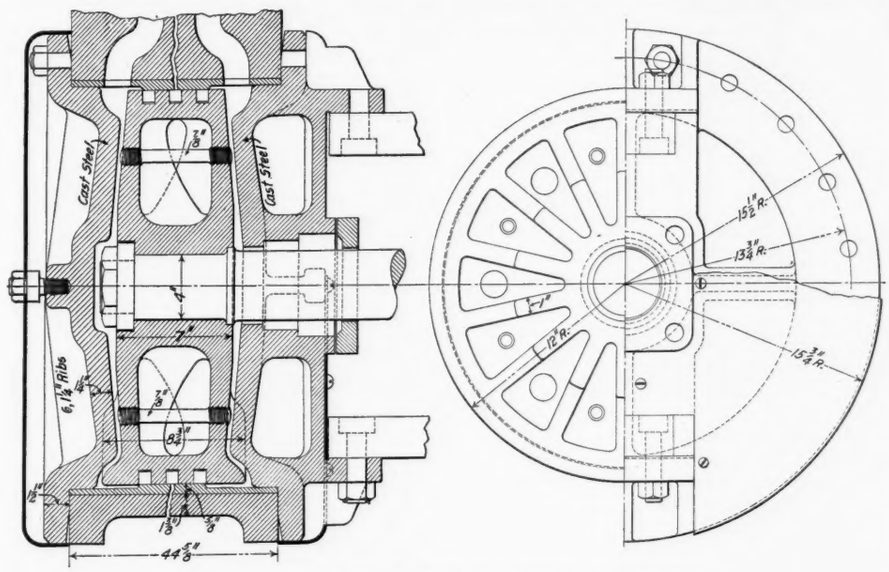
has been kept in view in designing the cylinders and frames for these engines. The cylinders and valve chambers are cast in one piece, and there is also a single whole saddle. There are no steam passages in the cylinder, except the ports and a single large side opening in the side of the valve chamber for the steam admission. The feet of the casting that bear against the deep slab frame are cooled or insulated by an air space between them. The cylinder walls and the connecting ribs have about the same thickness as the shell, so that shrinkage stresses are reduced to a minimum. That portion of the casting directly exposed to the heat of the live steam is perfectly free to expand and contract, the only effect being to raise and lower the valve chamber. The steam connection is made with a stuffing box at the valve chamber inlet with a ground ball joint on the face of the saddle.

The valves are of the piston type with central admission



Cylinder and Saddle for Slab Frame.

and end exhaust. Here, instead of coring the side of the cylinder casting and making a corresponding core in the saddle, the valve is made hollow, as usual, and the exhaust is led out through the valve chamber heads to pipes leading to the center of the saddle at the front and back. Here there is a curved exhaust passage leading up from the front and back to the center beneath the exhaust pipe. These passages are on a curve of long radius and sweep through 90 deg., so that they can expand and bend under the influence of the heat without putting any undue strain on the outside walls of the saddle.

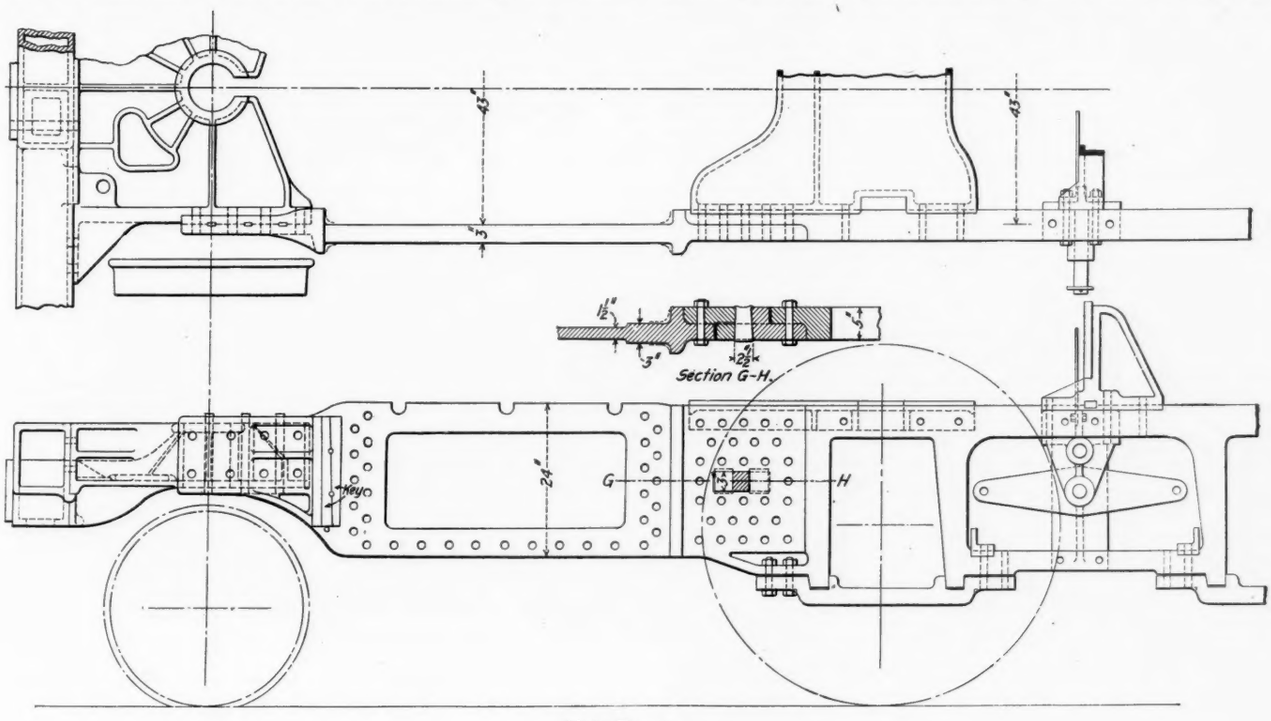


Piston, Front and Back Cylinder Heads and Casings.

The expansion of the steam passage is cared for in the same manner. The steam comes down from the T head through curved steam pipes on either side of the smokebox, in the usual manner, connecting with the passages of the saddle. As will be seen from the engraving, these are free from the sides and bed of the saddle and bend through 90 deg. in delivering to the sides. This internal pipe is, therefore, quite free to expand and bend and cannot put an excessive stress on the main body of the casting.

The cylinder and saddle are bolted to the deep slab of the frame by through bolts and the cylinders are firmly keyed in position in a manner that will be described later in the discussion of the frames. It will be seen, however, from the engraving of the cylinder and saddle, that it is a matter of no moment whatever that the faces of the cylinder and saddle should be in contact with each other as well as with the frame. The stuffing box in the valve chamber makes an expansion joint for the steam connection between the cylinder and saddle so that there may be an opening between the two at the frame without affecting the strength and unity of the whole. In fact, there is not the slightest advantage to be gained by having accurate and expensive planing done to make such a contact. It will be at once realized to what an extent this construction will symplify cylinder repairs. When a cylinder is broken, its replacement becomes nothing more than a roundhouse job, the only requirement being the facilities necessary to handle the weight. By removing the keys and slacking back the bolts, the cylinder can be taken off and another put in place, the only requirement being the reaming out of the holes for the fastening bolts so that they will come fair.

One of the minor points of this cylinder is the arrangement that has been made for drainage. It will be seen that a drip pipe can be led from the bottom of the valve chamber around the cylinder shell and down to the bottom. The cylinder is also to be bushed at the start. This makes it possible to use a strong gray iron for the main body of the casting, and a harder metal for the wearing surface. When this is worn it can be removed and renewed, which also brings the work within the domain of roundhouse facilities. Another advantage of this is that the metal best suited to the work



Slab Frame.

can be used both for the body of the casting and for the wearing surfaces, so that it will not be necessary to make a compromise in the specifications and call for a cylinder made from "homogeneous gray cast iron as hard as can be worked," to the detriment of both classes of service which such a compromise metal will be called on to render.

The fastening of cylinders of such dimensions as these is a serious matter; every precaution has been taken to make them secure and to provide a frame of sufficient stiffness and strength to properly carry the stresses to which it will be subjected. The slab of the frame is 3 in. thick and 24 in. wide, panelled at the center down to 1½ in. to reduce weight and planing area. This slab is drilled for thirty-one 1¼-in. bolts in a single row along the bottom, and a double, staggered row at the ends. This makes no provision for the top, where it is notched to receive three 2-in. through bolts that pass entirely across the engine and take the cylinder flanges on each side, thus clamping them together and drawing both in against the saddle.

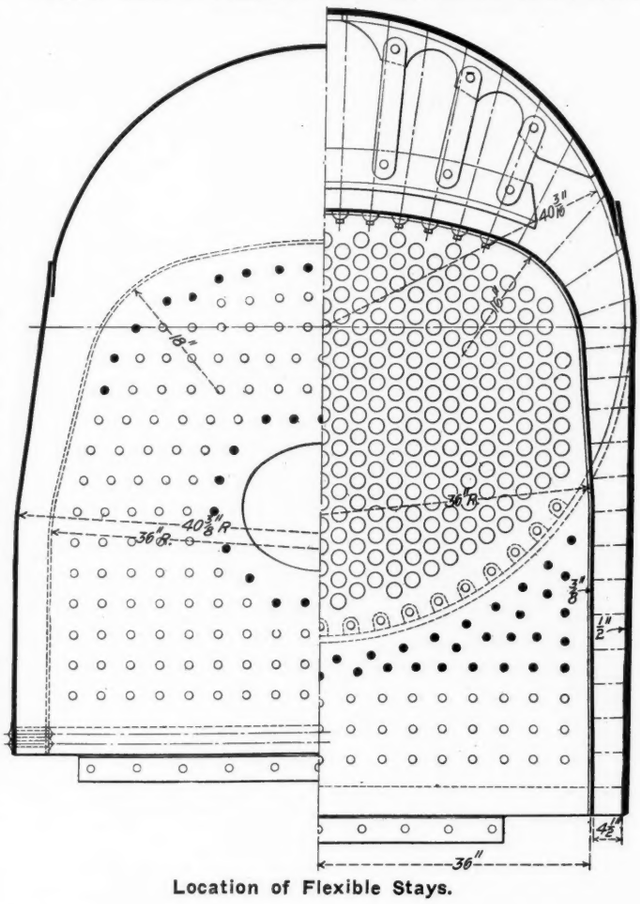
The frame is provided with lugs at the front and back ends of the cylinder and saddle seats. These parts are forced to a bearing against the one at the front by two keys at the back so that the whole structure is wedged firmly in position.

The splice between the front and back sections of the frame is in the usual place between the forward driving pedestal and the saddle. From the horizontal section of this splice it will be seen that the two parts have lugs each projecting into an opening in the other, and that a heavy key is driven in between them, forcing them apart and driving them against the lugs at the ends of the splice. This wedge is riveted over at the small end to prevent loosening and the whole is held together by thirty 1⅛-in. bolts. At the front the frame stops a short distance in front of the cylinder, where it is bolted and keyed to a strong cast steel front cross tie casting that serves for the front buffer and coupler connections. The frames are further braced at the back of the saddles by a substantial cast steel cross brace which also serves as a support for the air-brake cylinders.

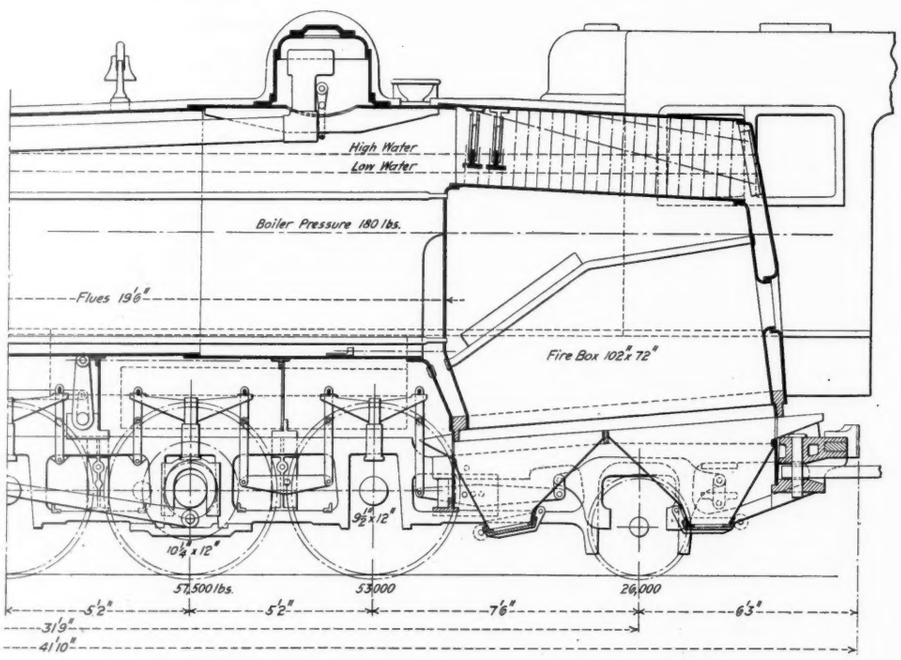
The front buffer also carries a very short pilot that is so stubbed that two of these engines can be coupled together head on if it becomes necessary to do so.

Returning to the cylinders for a moment, the design of the piston is of interest. It is of the box type with split rings sprung into grooves. It is bored and pressed on the piston rod with a pressure that is the equivalent of the steam pressure that will be exerted on the faces of the piston when the engine is working under 180 lbs. of steam. These are the usual details, but the method of bracing is not common. The brackets that are used to brace the walls do not extend all of the way across the space but alternate with each other and thus leave a zig-zag passage all of the way around the annular space, bracing the head and avoiding shrinkage strains. The walls are further stayed by bolts screwed and riveted in place.

The boiler is of ample capacity for the work and contains 373 tubes of 2¼ in. diameter. These tubes are swaged down to 2 in. at the firebox end for the double purpose of reducing the velocity of the gases through the tubes and of obtaining a wider bridge at the firebox tubesheet than would be possible with the full size tube. The bridge is, therefore, ¾ in. wide at the firebox and ⅝ in. at the smokebox. The shell offers no special features, but the walls of the firebox are slightly different from the common arrangement. Ordinarily on these wide fireboxes both inner and outer sheets are given an inward inclination from the foundation ring, the inside one rather more than the outside, by which a gradual widening of the water leg towards the top is obtained. It has been found, however, that this inwardly sloping inner sheet, where the slope starts at the foundation ring, is apt to cause a burning of the metal, which does not occur if it is carried up straight for a distance. This has accordingly been done in this case; both sheets are run up vertically 2 ft. 6 in. above the bottom of the foundation ring.



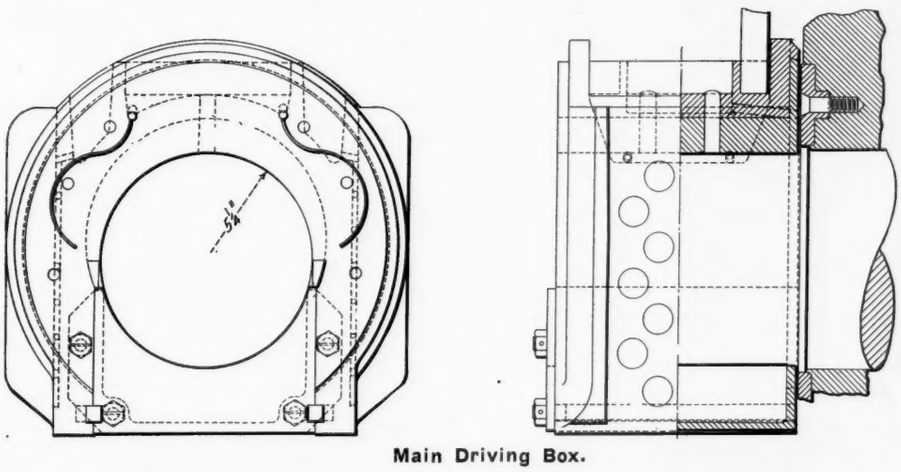
Location of Flexible Stays.



Rear Portion of Mikado Locomotive.

The arrangement of the steam passages in the saddle has

left the whole of the lower portion of the casting clear and advantage has been taken of this to carry a rectangular opening through it along the fore and aft center line, and to use it for the passage of a straight truck and front driver equalizer. This not only simplifies the forging of the equalizer itself but raises it so that it is clear of all braces and the radius bar and so much out of the way that the truck can be drawn out sideways; a point that will be of great advantage in roundhouse repairs by obviating the necessity of removing the pilot.

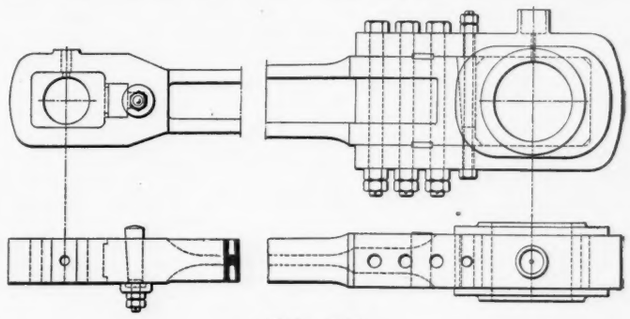


Main Driving Box.

The pivot connections and radius bar are of the usual construction, but the center plate is not. Instead of being a heavy and expensive casting with points of attachment for the hangers, it is a simple central casting with a heavy steel cross bar riveted to it and set under a lip on the casting so as to relieve the rivets of shear. In case of accident this can be readily removed and straightened or replaced without the necessity of scraping the casting. In other respects, the construction of the truck corresponds to those in general use.

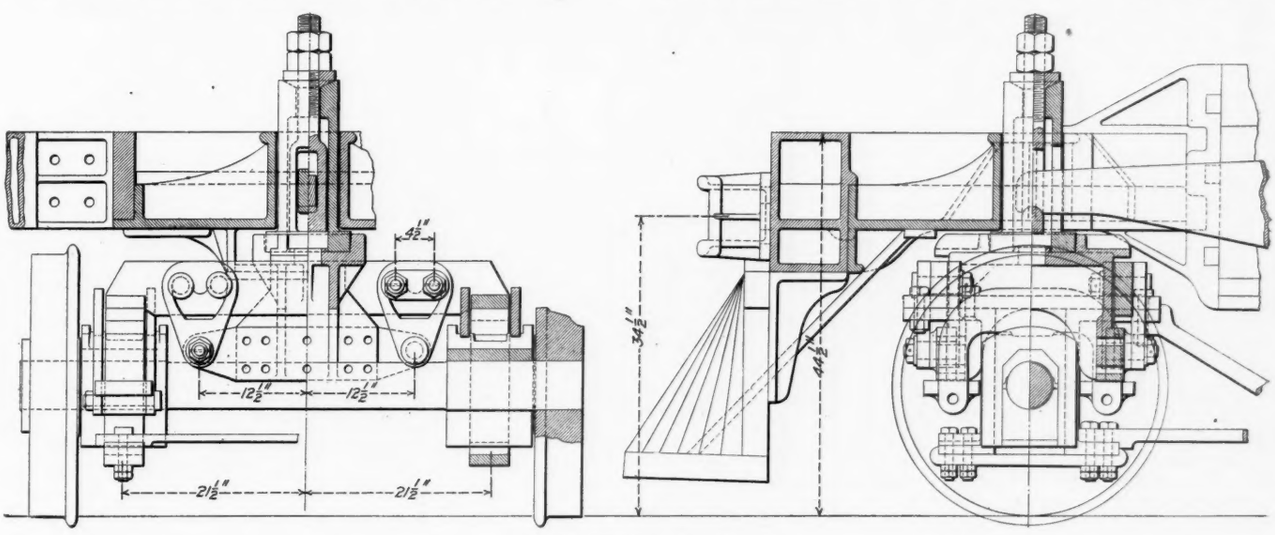
The driving boxes and hub liners have some interesting and novel features. The latter are put in place when the engine is new. They are made of cast iron and are finished to standard outside diameter and thickness so that they will fit all classes of locomotives. A groove with an annular space turned in it is put in the hub, and the ring on the liner will fit in this. It only remains, then, to bore out the inside to meet the individual requirements of the axle on which it is to be applied. It is held in place by a stud-screw tapped into the face of the hub. Of course these liners are to be split. The box liner and brass are cast together in the shell and are finished as usual in position. The principal peculiarity of the box, however, is to be found in the cellar. Usually the cellar is carried by the cellar bolts that are more or less likely to become loose and cause trouble. In this box there is a groove cut in the side near the bottom of the leg and a key is put in. This key has a head that prevents it from going through to the other side. A corresponding groove on the side of the cellar fits over the key and serves to hold the cellar up. The two, the cellar and the key, are held in place by a $\frac{7}{16}$-in. plate on the inner side of the box, which is, in turn, fastened by four $\frac{5}{8}$-in. studs with hexagonal nuts and split cotters. With this arrangement, the removal of the plate gives direct access to the cellar and packing from the sides and makes it possible to slip the latter out sideways. Or, by pulling out the keys, the cellar can be dropped down in the usual way. This method of carrying the cellar by keys is exceedingly simple and should prove a great convenience in oiling, packing and roundhouse overhauling. The shell is made of cast steel. At the top the brass is fastened by $\frac{3}{4}$-in. brass plugs, riveted in, and the wearing faces are fitted with white metal spots.

The main rod is of the usual I shape, with a cross wedge for adjusting the wrist pin brasses. The bolts for the crank-pin strap are relieved of the shear by keys driven between the strap and the stub end at the top and bottom. The oil cup is forged on and the other details are of the regular standard designs of current practice.



Main Rod.

With a firebox 6 ft. wide, or about 87 in. wide with the water legs and jacketing added, very little room is left between the sides of the firebox and the cab. The usual locations of the throttle lever, on top of the roof sheet or on the

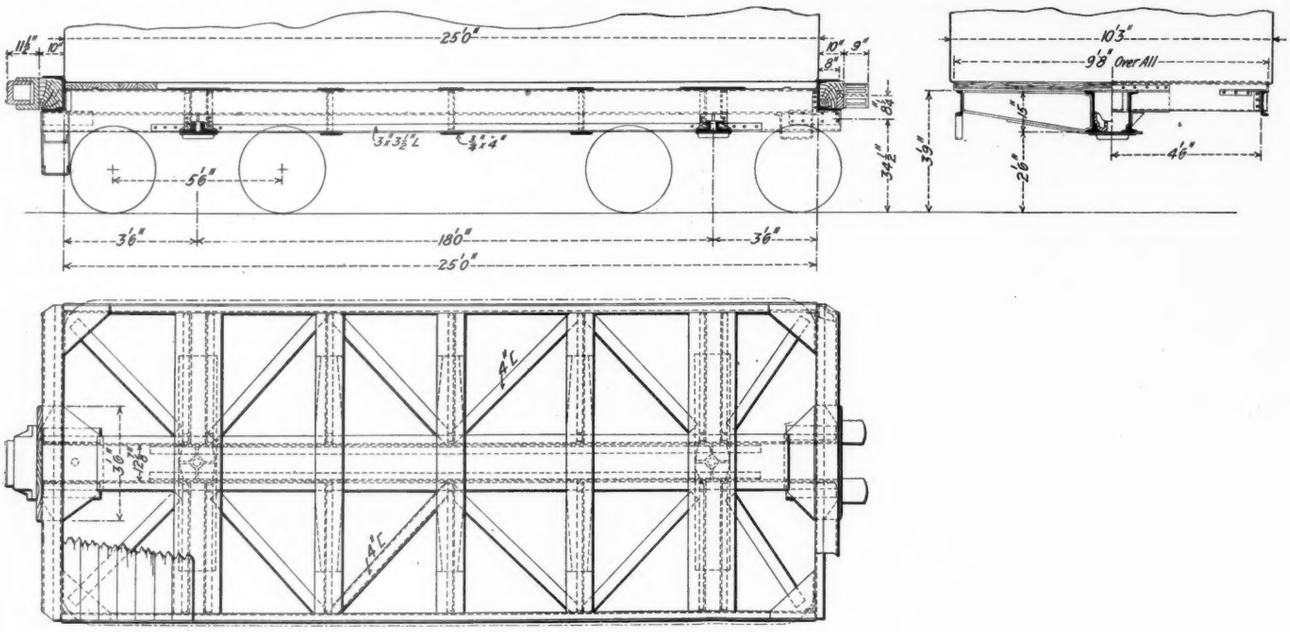


Front Engine Truck.

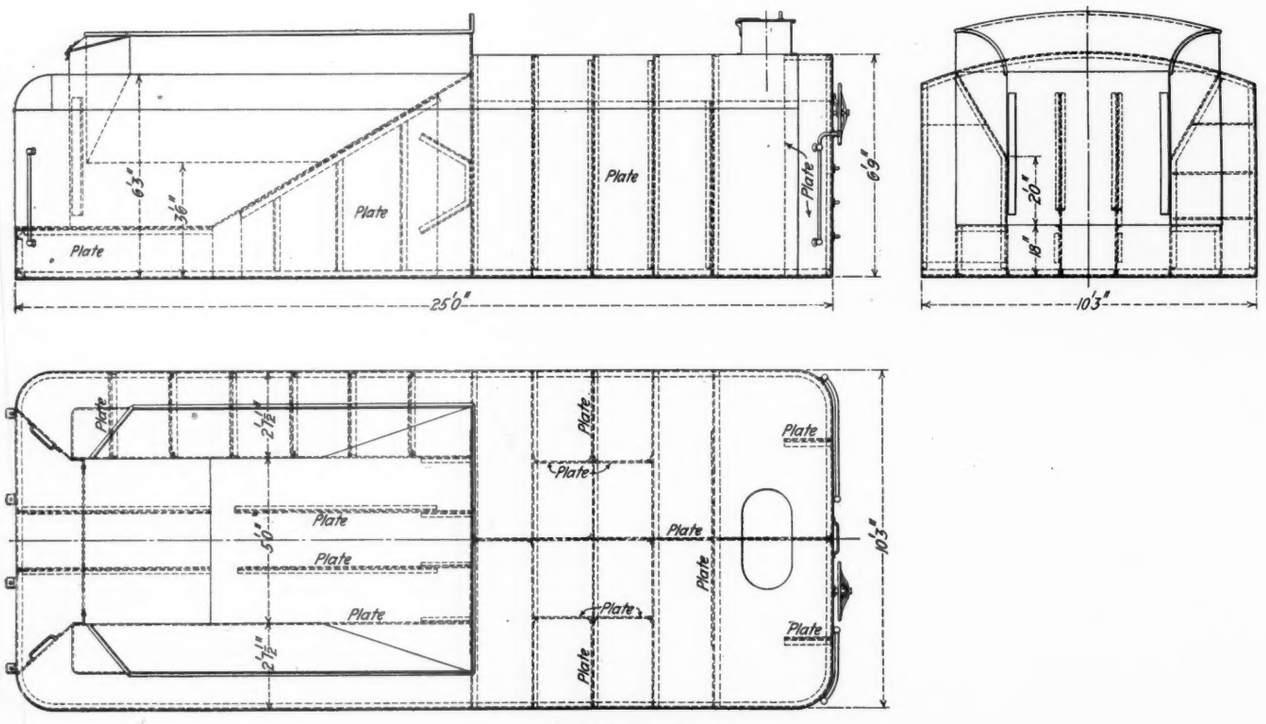
back head, are not very convenient for the engineman, and in some cases are so placed that it is very awkward to manipulate them. In this engine a decided departure is made from American practice and an imitation of some of the European designs is adopted. Instead of carrying the throttle stem out at the back head or back of the dome, a shaft is run out at the side of the dome, with an arm dropping down on the outside to which the throttle rod is attached. This requires a stuffing box on the side of the dome to care for the rotating shaft, which is a much simpler thing to do than to use one in which the road reciprocates. The only disadvantage lies in the fact that this stuffing box, being immediately in front of the cab and in the line of sight of the engineman, must be kept perfectly tight, or the escaping steam will be apt to interfere with his lookout ahead. The throttle lever will be put on the roof sheet, will have the usual locking latch and be placed on an incline so that the handle will be directly in front of the engineman, where it will be most easily manipulated.

The long wheel base of the engine makes the use of two sandboxes necessary in order that the front and rear wheels can be conveniently reached. The front box is of the usual shape with a circular horizontal section, but the rear one is flattened at the rear, and abuts against the cab. It is fastened to the boiler in the usual way and thus serves as an efficient brace to which to fasten the front face of the cab.

Owing to the great width of the boiler, the opening at the front of the cab will be too narrow for a man to pass through, so the usual door is dispensed with and a swinging window is put in its place. This cuts off egress from the cab to the

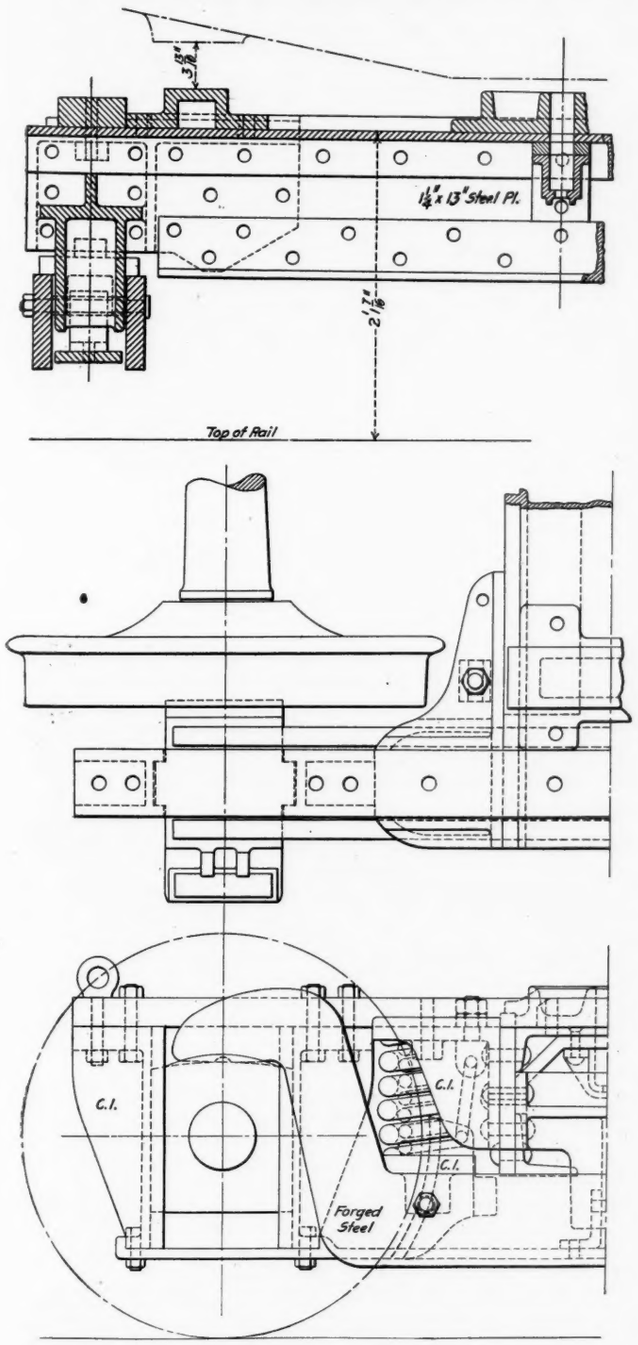


Tender Frame.



Tender Tank.

front. The hand rail is, therefore, carried back unbroken from the shell along the side of the cab and down at the back; then beneath the cab proper there is a shelf, wide enough and with sufficient opening above to afford a foothold for a man. This shelf extends out beyond the front face of the cab and for a distance beneath the running board. With this, it is possible for a man by grasping the hand rail and standing on this shelf to sidle safely along to the front of the



Tender Truck.

cab and then step on the running board and so get to the front of the engine.

The draft arrangements at the back of the cab are of the usual design, with the exception that the hole in the drawbar is rounded so as to avoid the corner wear that usually takes place.

The ashpan also presents a novelty of arrangement. It is of the usual double hopper type with sealed bottoms. But at the top there is a half hopper extending out at the front and back, while the air opening extends along the whole length of each side. This insures an ample supply of air for the combustion of the coal, the air entering at a point where it has direct access to the grate and does not tend to fan the ashes. The small half hopper at the back serves a double purpose. It affords an opening for the shaking bars and levers, and a grating is placed directly above it in the foot plate, through which all clinker taken from the firebox can be sent down to the ashpan. A similar disposition is made of all sweepings. There is an element of cleanliness in preventing this waste from being thrown out at the gangway on the right of way.

In the description of the coal car that was published in the *Railroad Age Gazette* of June 12, there was a detail of the bolsters and diaphragms that have been designed for use on all cars and tenders. These have, therefore, been applied to the tenders of these Mikado locomotives. The difference in the frame construction lies in the use of 4-in. channel diagonal braces and 10-in. channels for the side sills. A wooden flooring is used with a wooden buffing block backing at each end. At the back, the end sill is a 10-in. channel which comes up flush with the top of the floor planking. At the front there is a 12-in. channel for the end sill which rises 2 in. above the floor. This affords an abutment against which the tank has a bearing and will thus be prevented from sliding forward in case of a collision at the front. The only other difference between the tender and the coal car frames lies in the use on the tender of the regular bolster diaphragms for all cross ties, instead of the rectangular ones that are used intermediately on the car.

The tank has been made rather exceptionally large to reduce the number of water stops to as low a point as possible. The capacity is 9,500 gallons of water and 14 tons of coal. The coal space has the usual water bottom and is hoppered in every direction so that all the coal will come down to the front, where chain coal boards are used.

The interior of the tank deserves close attention because of the pains that have been taken to provide splash plates in such positions that all surging of the water will be positively checked. These splash plates are also made to serve as braces to the outside sheets. For example, there is a plate starting 2 in. from the bottom and running longitudinally along the center line to a height of 5 ft. 4 in. which effectually divides the water space into two parts. There are two plates projecting from the back, and just in front of the spout hole there is a cross plate reaching out to within 21 in. from the sides. In front of this, there are two longitudinal plates, each connected to the sides, and in the legs there are three other alternating plates. With this arrangement, the water must follow a zig-zag course in passing either from the front to the rear or across, being everywhere met by obstructing plates and narrow passages to destroy its momentum. Yet these plates and passages are so disposed that all parts of the interior are readily accessible to a man.

The engineer's tool boxes are worked in at the front end of the legs, but do not extend back quite as far as they are usually allowed to go. The top is rounded in turtle back shape but the corners are left square for economy of construction. There is no brake at the front end, but a tunnel brake is carried back to the rear, where it is worked by a vertical wheel with ratchet and pawl.

The tender truck is rigid, with equalizers, and is so spaced on centers as to take an even distribution of the load on the two trucks. The side frames are 2¼ in. x 5½ in. and are fastened by heavy steel castings to transoms measuring 1¼ in. x 13 in. These castings also serve as the top seat for the equalizer springs and form a stiff gusset connection between the side frames and the transoms. The latter are jointed together at the top by a channel riveted to each, with the web uppermost, and on this are placed the side bearings and the center plates. At the bottom there is a steel casting that drops down between the equalizers, serving as a guide to prevent them from tilting or getting out of line sideways, and also as an attachment for the pedestal tie bar whereby the latter is stiffened and really serves as a brace to the pedestals.

All of the driving wheels are flanged, and flexibility is obtained by varying the distances between the backs of the flanges. For the front and back wheels, this distance is 4 ft. 5 1/16 in., while for the second and main drivers it is 4 ft. 5⅜ in.

The following are some of the principal dimensions of these engines:

Cylinder diameter	24 in
Piston stroke	32 "
Boiler, diameter of shell	
Boiler, thickness of sheets	13/16 in.
Firebox, length	102 "
" width	72 "
" depth, front	6 ft. 4 "
" depth, back	5 " 6 "
" thickness, sides, back, crown	3/8 "
" thickness, tubesheet	5/16 "
" water space front	5 "
" water space sides and back	4½ "
Tubes, number	373
" diameter	2¼ in.
" length	19 ft. 6 "
Heating surface, firebox	198.6 sq. ft.
" " arch tubes	30.0 "
" " tubes	4,300.0 "
" " total	4,528.6 "
Grate area	51.0 "
Wheels, diameter, driving	56 in.
" " front truck	30 "
" " rear truck	36 "
" " tender	33 "
Journals, main driving	10¼ in. x 12 in.
" trailing, driving	9½ " x 12 "
" front truck	5½ " x 10 "
" trailing truck	5½ " x 10 "
" tender	5½ " x 10 "
Wheelbase driving	15 ft. 6 in.
" engine	31 " 9 "
" engine and tender	64 " 0½ "
Weight on driving wheels	219,000 lbs.
" total engine	269,000 "
" engine and tender	437,000 "
Tank capacity, water	9,500 gals.
Tank capacity, coal	14 tons.
Tractive effort	50,350 lbs.
Steam pressure	180 "

$$\frac{\text{Weight on drivers}}{\text{Tractive effort}} = 4.34$$

$$\frac{\text{Total weight}}{\text{Tractive effort}} = 5.34$$

$$\frac{\text{Tractive effort x diameter of drivers}}{\text{Heating surface}} = 622.62$$

$$\frac{\text{Heating surface}}{\text{Grate area}} = 88.80$$

$$\frac{\text{Firebox heating surface}}{\text{Total heating surface}} = 4.39^*$$

$$\frac{\text{Weight on drivers}}{\text{Total heating surface}} = 48.36$$

$$\frac{\text{Total weight}}{\text{Total heating surface}} = 59.40$$

$$\text{Displacement, 2 cylinders, cu. ft.} = 16.75$$

$$\frac{\text{Total heating surface}}{\text{Displacement, 2 cylinders}} = 270.36$$

$$\frac{\text{Grate area}}{\text{Displacement, 2 cylinders}} = 3.04$$

*Per cent.

LOCAL FREIGHT AGENTS' ASSOCIATIONS.

The twenty-first annual convention of the American Association of Local Freight Agents' Associations was held in Toledo June 16, 17, 18 and 19, with 210 delegates in attendance representing 60 associations. The report of the Secretary showed 86 associations members last year and one association—Superior, Wis.—dropped during the year, leaving 85 associations in good standing with a total membership of 993.

The following local associations presented applications and were elected members of the American Association: Baltimore, Md., 29 members; Los Angeles, Cal., 3 members; San Francisco, Cal., 2 members; Salt Lake City, Utah, 3 members; Springfield, Ohio, 4 members; Streator, Ill., 5 members; Wichita, Kan., 6 members. This makes a total of 92 associations with 1,045 members.

This includes about all the cities in the United States and Canada that are eligible under the constitution except Philadelphia and Washington; and local associations have now been formed in those cities and they will probably join soon.

At a special meeting Tuesday evening, June 16, Mr. Arthur Hale gave an interesting talk on "The Agent and Car Efficiency," showing the importance of all empty cars being reported as available and calling special attention to the necessity of great care in preparing and checking interchange reports.

Col. B. W. Dunn delivered an instructive and interesting stereopticon lecture on The Proper Handling of High Explosives. Mr. W. L. Ross gave the agents a lot of good advice about handling traffic and dealing with the public. Mr. C. H. Newton, a past president and now Freight Claim Agent of the Wabash, furnished a paper on how to decrease claims for loss and damage.

Atlanta advocated the sending along of billing for L. C. L. shipments that check short at intermediate points. In many cases the freight reaches destination and if the agent holds billing he can make delivery and collection on proper basis. This paper was endorsed by the convention and referred to the conference committee. [The conference committee discusses questions with other associations.]

Louisville recommended the abolition of "trap cars," i.e., the loading of L. C. L. freight in cars at industries and the switching of the cars to local freight houses for rehandling. Paper was endorsed and referred to conference committee.

New Orleans and Wheeling brought up the question of concealed losses and recommended a closer inspection of packages offered for shipment. Many standard packages now offered for shipment can be opened and part of contents removed without leaving any visible signs of the robbery. These papers were endorsed and referred to conference committee.

St. Louis presented a strong argument for the right of the carriers to greater compensation for handling freight consigned to "order" than for straight consignments, and Toledo recommended the marking of L. C. L. shipments so as to show they were consigned "To order." Both recommendations were endorsed and referred to conference committee.

St. Louis and Lincoln discussed the responsibility of forwarding agents and the necessity for starting a shipment right and showing all necessary information on billing at junction points.

Denver and Springfield discussed the best method of taking record of seals on cars interchanged. It was the sense of the convention that wherever practicable joint records of interchange and seals would give the desired result and that this seems to be accomplished by the Denver plan.

Savannah recommended interline billing for all interchange business. This was endorsed and sent to conference committee.

Rochester discussed delivery of astray shipments and recommended the establishment of a bureau for exchange of over reports at all points in the American Association.

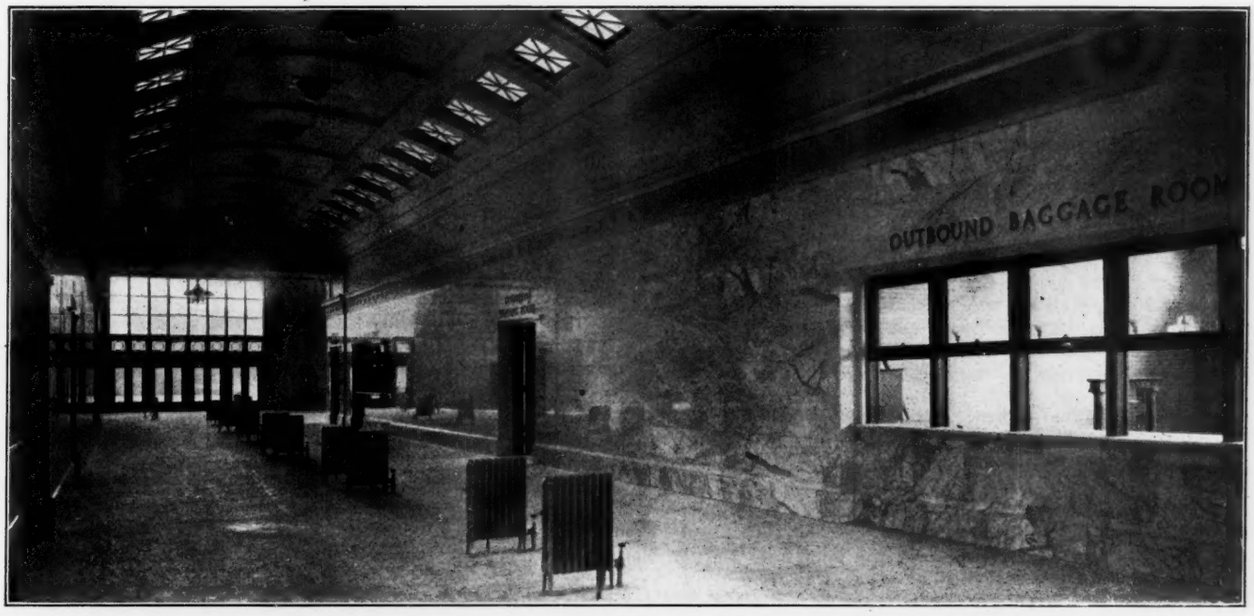
The Uniform Blank Committee made its report and it was voted that this committee be made a regular standing committee and the work continued. It was the sense of the convention that this question of uniform blanks for use at freight stations is one of the most important subjects before the association.

C. W. Nash, of the Albany Association, and agent of the Boston & Maine and the Delaware & Hudson at Mechanicsville, N. Y., was elected President; A. J. Giauque, Michigan Central, Detroit, was elected Vice-President; G. W. Dennison, Pennsylvania Company and Hocking Valley, Toledo, was re-elected Secretary, and C. E. Fish, Baltimore & Ohio Southwestern, Cincinnati, Ohio, was re-elected Treasurer. The 22d annual meeting will be held at Albany, N. Y., Tuesday, June 15, 1909.

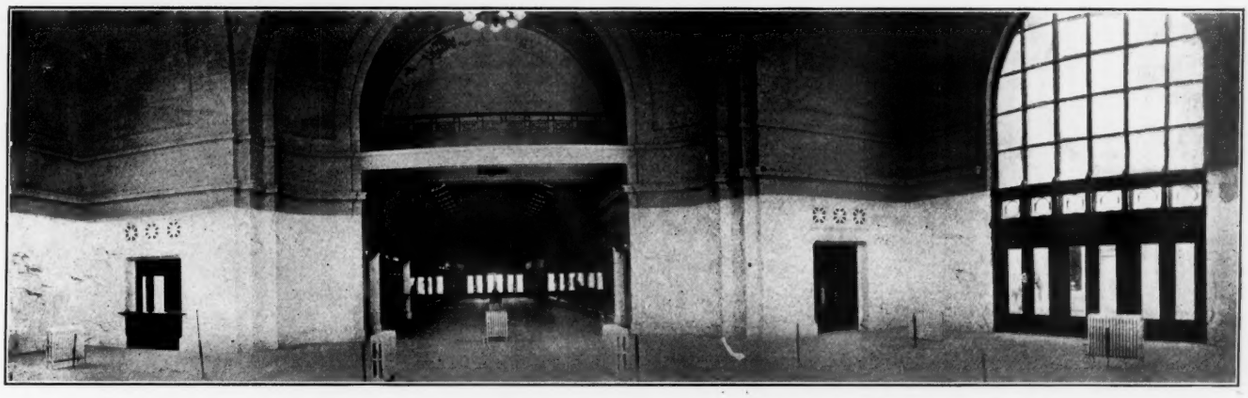
Russian journals report the approach to completion of what is claimed to be the longest wire rope carrier in the world, and of all places in the world, in Turkestan. The ancient city of Samarcand obtains its fuel from coal mines 80 miles distant, the road to which is so difficult that wheeled vehicles cannot traverse it, and the coal is brought on camels, which carry 360 to 430 lbs. each, taking five days for the journey. This costs about 35 cents per 100 lbs. (and very cheap at that). The ordinary fuel of that part of the world consists of cow dung and the grass of the steppes compressed into cakes. But for a city like Samarcand the supply is short. The cable carrier will be 54 miles long, beginning at a station of the Asiatic Midland.

NEW ORLEANS UNION STATION.

The accompanying photographs show views of the new passenger station at Canal and Basin streets of the New Orleans Terminal Company which was described in the May 29 issue of the *Railroad Gazette*. The aim of the architects was to combine simplicity with an impression of openness. The lobby, which is shown in the two interior views, extends from the station entrance to the concourse, and is about 200 ft. long. The walls are of marble up to 12 ft., and above that of cement. The floor is mosaic tile. The third photograph is of the sheds, details of which were shown in the previous article.



View from the Main Waiting Room Looking Towards the Concourse; New Orleans Terminal Company.



View from the Concourse Looking Towards the Main Waiting Room.

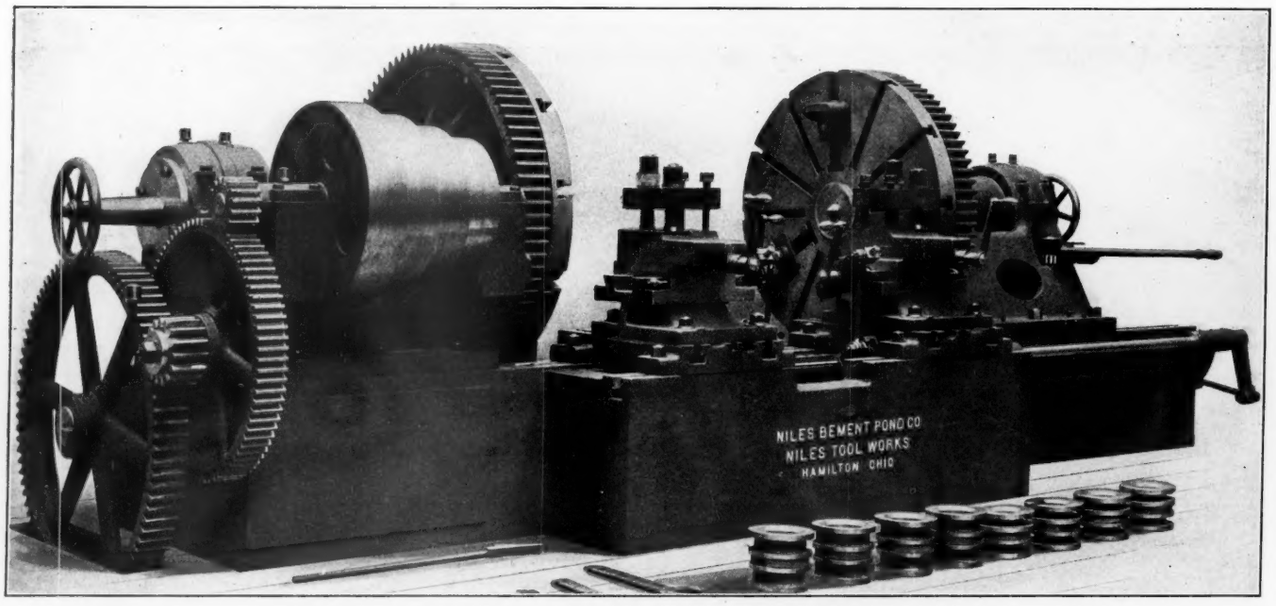
Inverted Umbrella Sheds Over Platforms.

STEEL-TIRED CAR WHEEL LATHE.

The accompanying illustration shows a 48-in. Niles lathe, designed for turning steel-tired car wheels up to 42 in. diameter and adapted equally well to steam railroad and electric railway requirements. The machine is arranged to take axles having either inside or outside journals. In turning wheels on axles having outside journals, the centers are removed and the axles chucked by collapsing bushings of suitable size which fit into taper sleeves within the spindles. The wheels are brought close to the face plates and gripped securely by patent "sure-grip" driving dogs, which engage the tires near the rim and hold the wheels absolutely rigid with the face plates. For wheels on axles having inside journals, the ordinary centers are used and the wheels gripped by the driving dogs in the usual manner. The face plates are mounted on spindles of extra large diameter. The right-hand head is movable on the bed by rack and pinion operated by lever. The tool rests have swiveling bases adjustable in and out on the carriages and provided with power longitudinal feed, driven by ratchets with positive connections which are operated from the rocker shaft at the front. The carriages can be adjusted for varying gages. The tool posts are fitted with the latest improved type of tool clamp, enabling the tools to be set with the most easily and quickly.

To prevent the chips which fall between the face plates from getting into the working parts of the machine a sheet-iron telescoping cover is provided, extending from one face plate to the other. The machine is supplied with a calipering attachment (not shown in this photograph) consisting of a cross-bar extending above and across the face plates and set exactly parallel to the center line of the machine. With this is furnished a suitable measuring device for determining the relative diameter of the two wheels. The drive is through a four-step cone, as shown. The machine can conveniently be arranged for motor drive, preferably a variable speed motor.

For railroad work the machine is provided with four sets of axle bushings for 3¾-in., 4¼-in., 5-in. and 5½-in. standard M. C. B. axles. For traction wheels, bushings suitable to diameters of axle journals will be provided.



Niles Steel-Tired Car Wheel Lathe.

Franz Ulrich, one of the ablest writers on railroad economics of this age, was retired June 1 from the Prussian State Railroad service, in which for the last 13 years he had occupied the position of President of the Cassel railroad directory. His best known work is a treatise on railroad rates, which appeared first in 1886, and in a French translation with additions in 1890. This work was for a long time the world's authority on the actual rates in the different countries of the world, and contained also a notable discussion of the principles governing railroad rates. In course of time rates have been so changed almost everywhere that it is no longer an authority on this branch of the subject. Ulrich also analyzed and discussed the Hungarian "zone" tariff, which in its time aroused great interest all over the continent of Europe, and has often been described, with its subsequent modifications, in these columns. Perhaps his most important service to his own country was a discussion of railroad rates in connection with the proposed system of deep canals in Germany, in which he showed that with a rational system of railroad rates much of what was proposed would be superfluous; and that no comparison of the cost of transportation by canal and by railroad can properly be made which does not include in canal charges tolls sufficient to pay interest on cost and charges for maintenance—a discussion which will need to be pondered and inwardly digested when the enlarged Erie Canal is opened. As Ulrich is not yet superannuated (he was born in 1844), we may hope for further contributions to railroad economics and administration from him.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.

This association held its summer convention at Niagara Falls, Ontario, June 23 and 24. The membership of the association now stands as follows: Two hundred and eighteen active members, holding 310 and 10 active memberships; 26 associate memberships by car service associations; 56 associate memberships by fast freight lines and private car companies, etc.; 37 honorary memberships. Total active and associate memberships, 392.

Following the suggestion of the American Railway Association, aiming at the co-ordination of association work, the plan suggested by the American Railway Association was adopted and the constitution amended so that Article 3, Sections 1 and 2, now read:

Sec. 1. Its action shall be recommendatory and not be binding upon any member.

Sec. 2. Such findings as may require authoritative action shall be submitted as recommendations to the American Railway Association, after having received the requisite affirmative vote of this organization.

The committee on car service, reporting on the question of how best to handle embargo notices, offered the following resolutions:

Resolved, That embargo notices to other lines be transmitted by wire and confirmed by mail, and that such notices should state whether or

not cars in transit will be accepted. Each road transmitting embargo to its connection to give the same a reference number and include the name of road first placing embargo and date that embargo was issued, and be it further

Resolved, That reclaims on account of cars held by connecting roads should be made against the road first placing the embargo; such reclaims to be certified to by intermediate lines, showing time that each car was offered by one road to another at junction point.

The resolutions were adopted. This practice if once established will afford roads an opportunity to store cars at more convenient and inexpensive points than at the termini, thus avoiding congestion.

This committee, after conference with the officers of the American Railway Association, reported in regard to new per diem rule No. 3. This rule differs from the application of Car Service Rule 5 in Per Diem Rule 9, in that there is no penalty for failure to observe the rules, while failure to observe Car Service Rule 5 penalizes the road to the extent that no delivery of a car is made and the delivering road would still be responsible for the per diem. In other words, Rules 1, 2, 3 and 4 of the Code of Car Service Rules have been made a part of the Per Diem Rules but without any penalty for failure to observe them.

This committee in its report included an outline of a scheme for a limited pool of freight cars, such, for example, as a pool confined to one district and to a definite percentage of cars used in joint traffic. On the recommendation of this committee the association again memorialized the American Railway Association on the question, Which line shall pay cost of transferring cars? recommending:

First.—The delivering road shall pay the cost of transfer:

(*a*) When transfer is due to defective equipment;

(*b*) When transfer is due to contents being improperly loaded;

(*c*) When transfer is due to delivering line not desiring its equipment to go beyond junction points;

(*d*) When cars will not pass clearances on receiving line.

Second.—The receiving road shall pay cost of transfer:

(*e*) When receiving road desires transfer to save cost of mileage or per diem.

The committee on conducting freight transportation, reporting on the best means of facilitating the movement of cars through yards, showed a form of report in use on the New York Central Lines. This form, C. T. 104, is designed to be made out on the departure of each train, and it shows the total amount of time which each car in that train has been delayed in the yard. There is a column in which the cause of the delay may be entered, where desirable or necessary. All of the reports of this kind for a given yard should be assembled daily and a condensed daily report made to the superintendent and other interested officers. With these reports the officer can prepare a comparative statement which, when circulated, will prove an incentive for each yardmaster to surpass the others in his record for prompt work. The summary may show fast freight separate from slow freight where desired.

The committee recommended and the association adopted the following rules to facilitate the making of the delay reports:

RULES FOR CHECKING DELAYS IN TERMINAL YARDS.

Empty Cars:

(1) Delay should be reckoned from time billed or ordered out in train ready for road movement.

Bad Order Cars:

(2) Should be counted from the time reported O. K. by Car Inspector.

Embargo Cars:

(3) Should be computed from the time connections report their willingness to accept or when ordered forward by proper official, when stored at other terminals or yards account such embargo.

Hold Cars on Special Order.

(4) Should be computed from time yard receives notice to forward.

Hold Cars under American Railway Association Rule 14:

(5) Time should be computed after interchange has been cleared or when connecting line requests delivery. Cars held back for other points to be reported from time of receipt of notice to forward.

Hold for Re-Consignment:

(6) Delay should be computed from time re-consignment order is received, and yard has proper billing for forwarding.

Change of route:

(7) Delay should be computed from time corrected billing or orders to forward has been received.

Cars for Home Route:

Cars Stored:

(8) Should be covered by Empty Car Rule No. 1.

No Bills:

Error in Billing:

(9) Time should be computed from time billing has been corrected or proper data furnished for forwarding.

Power and Switching:

(10) All cars held for switching and power or any other cause chargeable to the yard or operating division must be shown with full time of delay. The arrival and departure time as well as the total delay must be shown on the sheets in the proper column, and the yardmaster must show cause for delay on all cars delayed 12 hours or longer.

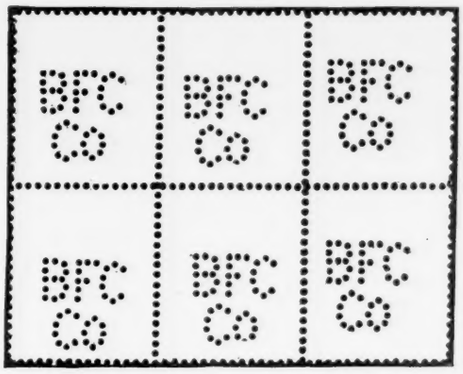
(11) Terminal Delay reports will be based on the class of freight handled; all live stock, perishable and preferred cars containing preferred commodities will be figured as preferred freight; all other freight as slow freight.

This committee says that traveling car agents on some roads are now making daily reports concerning the way in which explosives and inflammable articles are handled, these agents making inspections wherever such goods are found, and reporting their findings in detail under 16 different heads.

This committee recommended that the association authorize the formulation of a rule providing for a rate for the movement of empty cars (not new) when short-routed to their owners over roads not responsible for the return of the cars. The committee, assuming that the average cost of carrying companies' freight is 5 mills per ton per mile, and allowing for the usual percentage of empty mileage, estimates that empty cars, weighing on an average of 17 tons, ought to be charged for at 5 cents per car-mile. This is made up of 3.57 cents per car per mile for hauling, 1 cent per car per mile for per diem and 0.43 cent profit.

The committee on conducting passenger transportation presented two papers prepared by individual members, one on suburban traffic and the best methods of handling it, and one on the electrification of suburban roads. This committee has reached the conclusion that the most economical length of baggage car is 50 ft., from the standpoint of both maintenance and operation, and that 60 ft. is the greatest length that should be used. On some very light runs cars less than 50 ft. long are economical. The 70-ft. car should be used only in extreme cases. Even theatrical companies would put up with 60-ft. cars if they knew that that was to be the standard maximum length. For theatrical business the end doors should be 3 ft. wide. Every baggage car should have two side doors, as near the center of the car as practicable.

The committee on handling railroad business mail expects to present at the next meeting a compilation of the laws, regulations and decisions as to what may be carried as railroad business mail. Attention is called to the fact that on unsealed printed matter the government claims no monopoly.



Form of Postage Stamp Perforation.

The committee recommends that at large railroad offices mail should be assembled, as often as may be necessary, during every day, for the purpose of reducing the number of pieces by having all mail for each person brought together and put into as few envelopes as possible. In one railway exchange it was found that the number of pieces to be handled might thus be reduced 40 per cent. The same rule applies to matter sent by the United States mail. In one department where this method of assembling was recently introduced over $75 a month was saved in postage stamps.

This committee announces that the Postmaster-General has issued an order under which users of large quantities of United States postage stamps may have them perforated with letters

to identify their ownership and prevent pilfering. The perforations must be not over $\frac{3}{32}$ in. in diameter, and the perforated letters must not occupy a space more than ½ in. square. The committee recommended that railroad companies avail themselves of this privilege. Its report was adopted.

The Committee on Office Methods and Accounting, reporting on the subject of arbitrary deductions from monthly per diem reports, recommended that no deduction be made from the monthly per diem reports for alleged over-payment in preceding months, and that such over-payment be handled as a special reclaim, and the association

Resolved, That the American Railway Association be requested to amend the per diem rules so as to close all per diem accounts, including all discrepancies and reclaims for years 1902, 1903, 1904, and from January 1st to July 1st, 1905, not presented prior to July 1st, 1908, and provide that all reclaims be presented within the year limit as provided in Rule 11 of the Code of Per Diem Rules.

The association again confirmed its recommendation of a code of arbitrary marks for reporting cars, to save the clerical work and confusion involved in using the initials of the roads; and the code will be urged on the American Railway Association. This code is made with a view to using the fewest possible letters in recording freight cars, for example:

Pennsylvania R. R. .....P.
Philadelphia & Reading Ry. .....R.
Pennsylvania Lines West of Pittsburgh .....P. L.
Delaware, Lackawanna & Western.....L.

It is recommended that the designating letter be put immediately above the car number on the lower left corner of the car.

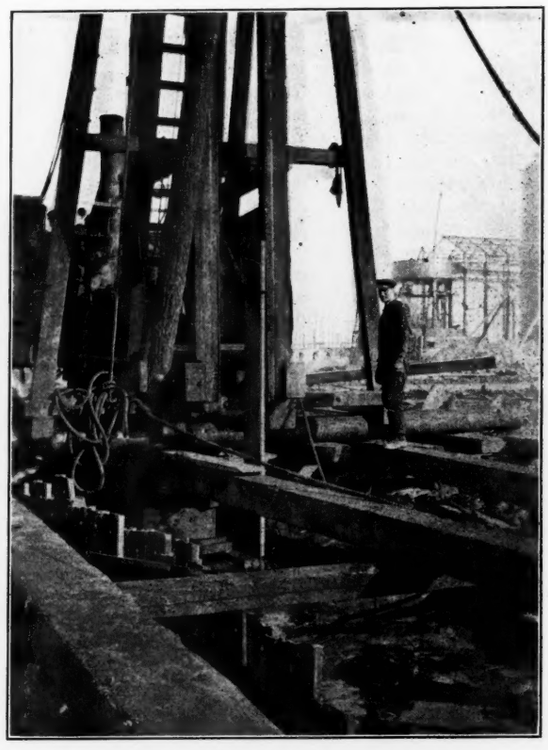
The next two regular meetings of the association will be held at Cincinnati, Ohio, December 8, 1908, and Montreal, Que., June 22, 23, 1909.

STEEL SHEET PILING FOR PIPE LINE TRENCH.

On February 15, 1908, Pihl & Miller, Pittsburgh, Pa., started building the intake pipe line for the blast furnace of the Wickwire Steel Co., on the Niagara river, near Buffalo, N. Y. The contract called for the installation of a cast iron pipe 30 in. in diameter and 700 ft. long, which necessitated digging a trench 5 ft. wide and 12 ft. deep on the average.

The Wickwire plant is being built at a place where the sand and gravel at a depth of from 3 to 4 ft. is soft and partly quicksand. The trench had to be run through this material. For this work, the contractors used a steel-lined centrifugal sand pump, 8 in. suction, 6 in. discharge; a small pump for jetting into hard sand, and 150 pieces of 12-in., 35-lb. United States steel sheet piling, 16 ft. lengths, manufactured by the Carnegie Steel Co., Pittsburgh, Pa. To drive the steel sheeting, they used a pile driver with a 2,800-lb. hammer, with drops of 3 ft. to 4 ft., while in the hardest material a jet was used. The first section, a stretch 60 ft. long, was built by driving and pumping. Then the sand became so soft and had so much water in it that it worked through the steel sheeting where it was not watertight. It was found that by placing braces, consisting of ends of old wooden piles or railroad ties, about 3 ft. from the top of the trench and 8 to 10 ft. apart, the steel sheeting between the braces was put in tension, making the joints water-tight. Wooden sheeting could not have been driven so as to secure this effect. The condition of the soil was such that the bottom of an excavated trench when left over night would raise from one to three feet. Even if wood sheeting could have been made water-tight, the cost of material, with waling strips and cross braces, would have been $2,600; driving and pulling, $1,600, and the value of the lumber left would be about $500.

Enough steel sheeting was bought for a trench 70 ft. long, accommodating five lengths of 30-in. pipe. No waling strips were used for this trench, and the bracing required about 2.5 b.m. ft. of lumber per lineal foot of trench. The cost of the sheeting was $1,795. Driving and pulling cost $2 per lineal foot of trench, or about $1,500. This made a total outlay of about $3,300, as compared with an estimated outlay of $4,200 if wood had been used. The steel sheeting is inventoried by the contractor now at $1,400. The total saving through the use of steel was therefore estimated at about 48 per cent.



Steel Sheeting Ready for Driving.

Steel Sheeting at Lake End of the Trench.

Besides the actual cost of sheeting, the few braces in the steel sheeting made it much easier to lower and handle the cast iron pipe. In this particular case, the braces would not have impeded the excavating, as a centrifugal pump was used, but where material is handled by pick and shovel the fewness of the braces in the steel-sheeted trench would make the work quicker.

The average gang used to handle the pile-driver, sheeting, pumps and boilers was 10 men. About four months were spent on the work. The steel sheeting was driven and pulled eight times, and as no driving cap was used the ends of most of the pieces became battered and out of true for from 4 in. to 8 in. from the end. It is claimed, however, that the battered ends can be placed in a forge and straightened at a small cost.

RAILROAD TELEGRAPH SUPERINTENDENTS.

The 27th annual convention of the Association of Railway Telegraph Superintendents was held at Montreal, beginning June 24, President E. P. Griffith (Erie) in the chair. It was probably the largest attended gathering in the history of the association, over 150 members being present. A large number of new members were elected, including signal engineers, train masters, inspectors of transportation and railroad officers in other operating departments. Among the honorary members elected were Wendell Baker of New York, L. H. Korty of Omaha, Neb., F. G. E. Ferguson of Vicksburg, Miss., and H. C. Sprague of St. Louis.

The first paper was that of W. W. Ryder, Superintendent of Telegraph of the Burlington, on "The Telephone in Railroad Service," which was printed in the *Railroad Age Gazette* last week, page 377. Mr. Ryder gave the following list of roads using telephones for train despatching and the mileage covered by this service, either in actual operation or authorized:

Illinois Central	2,536
Chicago, Burlington & Quincy	746
Chicago & North-Western	478
Chicago, Rock Island & Pacific	333
Michigan Central	259
Chicago, Milwaukee & St. Paul	223
Great Northern	202
Northern Pacific	109
Baltimore & Ohio	105
New York Central	95
Lake Shore & Michigan Southern	88
Delaware, Lackawanna & Western	62
Wheeling & Lake Erie	60
Canadian Pacific	49
Pennsylvania Railroad (branch lines)	225
Lake Erie, Alliance & Wheeling	104
	5,674

Following Mr. Ryder's paper, S. L. Van Akin, Assistant Superintendent of the New York Central at Syracuse, told of the experiences on his road in the introduction of telephones. After trying a number of schemes, Gill's new type of telegraph selector was adopted, and that is now giving satisfactory service. The telephone line is to be extended to Little Falls, which will make it 73 miles long. The experimental circuit between Albany and Fonda, 44 miles, was ready for service September 29, 1907, but was not put in use until October 2 (three days later), as the railroad company was able to meet the conditions of the nine-hour law (New York state, effective October 1, 1907), with telegraph operators, and for obvious reasons it was thought best to commence operations by telephone after the conditions of the law had been met. The spirit of antagonism toward telephone train dispatching was very pronounced from time to time, but the issues have been successfully met. Following this discussion the entire afternoon was given up to a session on the same subject, from which reporters and the general public were excluded.

On Thursday, the second day, the first paper was on "Commercial Reports," by Joseph P. Church, chief clerk of the telegraph department of the Wabash. This will be dealt with in a future issue. The next paper was on "Reduction of Telegraphing by Use of Printed Forms," by O. C. Greene, of the Northern Pacific. Mr. Greene's road is very long and the general offices are at one end, so that much correspondence has to be done by wire, and a large number of forms are in use. He finds, however, that a multiplicity of forms may be objectionable, as operators will have difficulty in finding the right blank at the right time. As soon as conditions change so that the designating letters on a form do not provide for all of the information required, the form should be revised. Sometimes new blanks are introduced when the revision of an existing blank would accomplish the same purpose. The divisions of a form should be separated by heavily ruled lines, and the spaces should be large; otherwise the operators will mistakenly use the wrong spaces, and the benefit of the blank will be neutralized by the number of messages which will have to be sent to correct the mistakes.

The next paper was on "Dry Battery," by U. J. Fry, Superintendent of Telegraph of the Chicago, Milwaukee & St. Paul. Mr. Fry said: "Our experiment with dry battery on the block wire between Brookfield and Waukesha, referred to last year, failed after three years' service. This means an expense of $5.12 as against $102 first cost and maintenance for three years of the same number of cells (32) of gravity battery. Estimating the service on a railroad operating 2,000 miles of block signal and using our present form of block wire, the 4,000 cells of gravity battery necessary would cost, including maintenance, for three years, $14,000, while double the number of dry cells (8,000) will cost $1,280, or a difference of $12,720, $4,360 per year, or $2.18 per mile of road per year.

"While constructing a telegraph line along our Pacific Coast Extension we found it impossible to prearrange for gravity battery service, and we are now using dry battery temporarily by connecting up a sufficient amount to operate a wire 100 to 150 miles long. We insert a sufficient amount of resistance to bring the current down to about 50 M.A. while the circuit is short. When more wire is added we cut out resistance from time to time to equal the wire resistance added, maintaining as near as we can 50 M.A. current. You can readily appreciate that by using a large number of cells, and inserting resistance, the discharge from each cell will be exceedingly low and the expense small. We can carry the battery with the construction outfit until needed, when we can set it up in almost any place and pay no further attention to it, except to cut out resistance occasionally. We used a set of dry battery in this way for six months. While it is not possible at all times to find a safe place for gravity battery to operate local sounders, we found it very convenient to use 50-ohm sounders and keys pending the construction of station houses and the installation of standard instruments.

"*Shop Notes.*—To determine the number of cells of gravity battery necessary to furnish approximately 30 M.A. current for 1, 2, 3, 4 or 5 wires, when the resistance of each is about equal, select one of average resistance, add the relay resistance; multiply by the constant given below opposite the number of wires under consideration. The amount shown will represent the total number of cells required, which should be divided and half the number placed at each end of the circuits:

No. of Wires.	Current M. A.	Constant.	No. of Wires.	Current M. A.	Constant.
1	30	.032	1	45	.049
2	32	.034	1	50	.055
3	34	.0365	1	55	.061
4	36	.039	1	60	.066
5	38	.0415	1	65	.071

While not theoretically correct, this formula will be found sufficiently so for ordinary cases. When using gravity battery the current will be reduced about 2 M.A. for each wire added, on account of the internal resistance in the battery, while with dynamo current the drop, if any, will not be noticeable.

"In each of the cases shown, when all wires are closed, each will receive approximately 30 M.A. If one should be opened, the current in each remaining closed will rise about 2 M.A., etc. Should three be opened, the current in those closed would rise 6 M.A. Not more than four wires should be fed from the same source, because the variation during damp weather, when it is necessary to adjust high, becomes so great and the margin so small that the wires will not work well. Five wires would cause a variation of 10 M.A., and you can appreciate what this means under such conditions. When inspecting our main line battery, or for testing one or more cells of dry or gravity battery, we find it convenient to have a small compass with us. One that costs 25 cents will answer the purpose, and by making a few tests with battery we know is bad up to one we know is in good condition we can form some idea as to what reading we should have and decide accordingly. Place your compass conveniently near the one

or more cells, bring a wire from one pole of the battery to the compass, place it on the compass immediately over and parallel with the needle, hold it firmly with one finger, and when the needle is quiet complete the circuit with a wire from the other pole and note the deflection of the needle."

In the discussion that followed the reading of this paper, J. J. Ghegan, of New York, explained at some length the form of telegraph keys used in dry battery open circuit work. W. F. Williams, of Portsmouth, Va., said that on the Seaboard Air Line they used an average of 1½ cells of dry battery to the mile of wire.

E. A. Chenery, of St. Louis, Superintendent of Telegraph of the Missouri Pacific, read a paper on "Adverse Railroad Legislation." He carefully considered the trend of legislative action in its effects on the railroads.

The first matter taken up at the afternoon session was the reading of the paper, "Past, Present and Future of the Association," by W. F. Williams, of Portsmouth, Va. The reading of this paper brought out interesting reminiscences from Charles Selden, of the Baltimore & Ohio, and William Kline, of the Lake Shore & Michigan Southern.

C. S. Rhoads, of the "Big Four," read a paper on "Qualifying Operators for Train Despatching." Mr. Rhoads began by referring to the fact that 90 per cent. of young men starting out in life fail in their chosen vocations. This would be a startling thing but for the fact that the individual is the only sufferer from this failure. In train despatching, however, if a man fails, dozens or hundreds of other persons are made directly to suffer. In looking for the right kind of men for despatchers, the first thing, besides the obvious qualifications, is to find men who are resourceful and who are not satisfied with doing their bare duty. It is no longer sufficient, from a technical standpoint, that the despatcher be a good Morse operator; he must also have a telephone voice and a telephone ear. Every despatcher should have had good experience at a way-station where he can learn, not only station men's work, but also what the trainmen have to do. This young man has a great advantage over the one who is nothing but a telegraph operator. In examining a man for the position of despatcher it is important to see that he appreciates every factor of safety, even what are usually termed only precautionary items. It is a common rule in many occupations that a person is not at his best until after he has made a few mistakes; but train despatching is an exception to this rule. The despatcher must never make a mistake. Certainly no operator should be promoted whose record does not warrant the conclusion that "in all cases of doubt or uncertainty" he will "take the safe course and run no risks."

J. H. Jacoby read a paper on "Wiring of Station Buildings from the Contractor's Standpoint." This paper was discussed by Messrs. Selden, Camp, Drew and others.

On the third day, William Maver, Jr., of New York, read a paper on "Wireless Telephony." L. B. Foley, of the Delaware, Lackawanna & Western said that his road had used the wireless telephone system with satisfactory results between the Hoboken terminal and the ferry boats on the Hudson river. The distance over which conversation was carried on satisfactorily was two miles.

A committee, consisting of Messrs. G. A. Cellar, G. H. Groce, G. W. Dailey, E. H. Millington and Charles Selden, was appointed to consider the question of high tension wires crossing railroads. Members of the association wishing forms, rules and regulations governing the crossings of railroads by foreign wires can go to this committee for what they desire. While some of the states had adopted laws governing this important subject, other states had taken no action whatever, with the result that no prescribed forms were observed. Many of the crossings were dangerous, and it was the sentiment of many of the superintendents that uniform legislative action should be secured in every state.

Detroit, Mich., was selected for the place of meeting in 1909, and the date is June 24-26. The election of officers for the ensuing year resulted in the choice of Vice-President William J. Camp, of Montreal, electrical engineer of the Canadian Pacific, as president; G. W. Dailey (Chicago & Northwestern), vice-president, and P. W. Drew (Wisconsin Central), secretary and treasurer, an office which he has held continuously since 1883.

On Friday night about two-thirds of the delegates went to Quebec and spent Saturday there.

EXHIBITS.

Railroad Supply Company, of Chicago.—Represented by E. W. Vogel, Signal Engineer.—The Chicago Crossing Signal, equipped with a Chicago Automatic Cut-out. Lightning arresters, Styles A, B and C (choke-coil), with and without fuses. A new style of lightning arrester (Style F). This arrester is small and compact, but it presents between 700 and 800 sparking gaps to the ground terminal, which is made from a non-fusible material.

Stromberg-Carlson selective alarm telephone dispatching system.—Apparatus for a complete despatcher's office on one side of the room, connected up as in regular practice, with five complete equipments representing local stations. In this system the selectors are on a common battery circuit, requiring a pressure of only .15 of an ampere.

Western Electric Company.—Complete line of telephone equipment for use in railroad service. Composite telephones, wall sets and line poles; portable car sets for regular telephone lines. Complete collection of telegraph equipment. The Gill and Burlington selectors, both of which are sold by this company. The Western Electric Company was represented by W. E. Harkness and M. E. Launbranch, of New York; C. L. Howk and H. C. Curries, of Chicago.

United States Electric Company.—The most recent adaptations of the Gill selector to the telephone in train despatching. This exhibit represented apparatus now in use on the New York Central, the Canadian Pacific, the Lake Shore & Michigan Southern and several other roads. The despatcher can call automatically any station at will and get an automatic answer back in seven seconds. A further exhibit was made of the Gill selector, showing its adaptation to high-speed multiple calling. This comprised twenty-four station equipments with a train despatcher's automatic calling device, consisting of a case containing twenty-four push buttons and an automatic signal call box to operate it. The despatcher, when calling, first presses the buttons corresponding to the station or stations he wishes to call, the automatic signal is then set in motion, and any or all stations desired are called by one operation. By this method any one of the stations can be called in from one to six seconds, and all of the twenty-four stations can be called in eighteen seconds. This company was represented by Edwin R. Gill, Harrison Osborne and Howard E. Merrell.

THE AMERICAN SOCIETY FOR TESTING MATERIALS.

The eleventh annual meeting of The American Society for Testing Materials was held at the Hotel Traymore, Atlantic City, June 23 to 27. There were nearly 300 members in attendance and the total membership of the Society is now 1,015. The report of the Executive Committee states that the President and Secretary of the Society were instructed to communicate with the various government branches concerned in the testing of materials with the view of acquainting them with the general tenor of the discussion at this conference and invite their co-operation in the transactions indicated. The replies received evinced a highly gratifying desire to co-operate with the Society and ten different government bureaus connected with testing are now in co-operation with the Society.

At the first session an interesting paper was read by W. A. Aiken under the title "Testing is Not Inspection," in which the author called attention to a practice governing the work of large departments in which the specifications for materials were submitted to prominent manufacturing interests for their criticism to ascertain if they could be complied with by modern and fairly equipped plants. In this way one vexed question was eliminated, as it disposed of the objection by manufacturers that the specifications were unnecessarily stringent. The paper also emphasizes the fact that the test piece should be representative so far as possible and selected by the inspector. With reference to the inspection of structural material, Mr. Aiken said that even when the effort was to get at the greatest tonnage constant vigilance is necessary to obtain always full sections in eyebeams, channels, etc. The conclusion of the author was that commercialism has been the bane of most so-called inspection in this country and that the quality of the service rather than its cost should be considered. He said that the character of the service obtained under his supervision during the past eight years has established the fact that inspection can be done at a reasonable cost, as it should be done, but seldom is done.

The principal interest in the meeting so far as it relates to railroads was that concerning rails and a whole session on Wednesday afternoon was devoted to this subject. It was introduced in a general way in the annual address by the President, Dr. C. B. Dudley, at the evening session on Tuesday, when he took for the subject, "Some Features of the Present Steel Rail Question." Part of this address is printed in another column.

At the special rail session on Wednesday the report of Committee A on "Standard Specifications for Iron and Steel" was presented by W. R. Webster. This relates entirely to the rail specification and three changes from previous specifications.

recommended by the Committee, were submitted to letter ballot as follows:

(1) To modify paragraph 3 to the effect that one drop test shall be made on every blow of steel for rails weighing 85 to, and including, 100 pounds per yard.

(2) To modify paragraph 14 to the effect that No. 2 rails shall be accepted to at least 5 per cent. of the whole order.

(3) To add the following sentence to paragraph 14: "Rails rejected under the drop test will not be accepted as No. 2 rails."

The preliminary program, "Results of Work on the Metallurgy of Steel in Progress at Watertown Arsenal," was the subject of report by J. E. Howard and related entirely to the physical properties of rails. Mr. Howard considered mechanical action due to the wearing of the wheel on the track which produces brittleness in the rail, causing a flow of metal on the top of the head and the microscopic investigation emphasizes this effect of wheel pressure. When steel is strained beyond its elastic limit scale starts off of the surface and the effect of gagging is seen by marks of this kind, but the author has no evidence to show that rupture has taken place due to overstraining applied in the straightening process. The heat of the surface of the rail when driving wheels slip before starting a train and the sudden cooling of the wheel results in cracks or minute fissures which are a menace to a rail as a whole. The author also treated at length the marks or lines on etched specimens of rails, this feature was similar to that presented at the meeting of the American Railway Maintenance of Way Association, March 20, 1908, and illustrated in the *Railroad Gazette* in connection with the proceedings of that meeting. These lines parallel with the direction of rolling of the rail are regarded as elements of weakness and they have been traced by Dr. Henry Fay to the presence of manganese sulphide.

In the discussion of Mr. Howard's paper by J. P. Snow, Chief Engineer of the Boston & Maine, he said that there are three classes of longitudinal seams, gas, rolling flaws and slag inclusions. The large number of breakages in the winter of 1906 and 1907 were due to unsound rails, the streaks in rails run into fissures if followed far enough, and he attributes them to gas bubbles in the plastic and steel of the ingot and hence calls them gas seams. Gas holes or blow holes can be decreased by proper means of deoxidization and quieting the steel coupled with moderately slow teeming. Rolling flaws are generally crooked and very minute, but they are sometimes visible on a new rail as a distinct mark several feet long. Most of the present base failures start at longitudinal seams and Mr. Snow believes them to be due to rolling flaws. Other rail failures are due to gas seams on the surface. Rolling flaws due to cracks in the skin of the ingot or bloom he believes to be the cause of defects responsible for more broken rails than all other causes combined. Mr. Snow's discussion was followed by a very interesting and original paper on "Microscopic Investigation of Broken Steel Rails, Manganese Sulphide as a Source of Danger," by Henry Fay, of the Massachusetts Institute of Technology. In this paper Dr. Fay has shown conclusively that many of the fractures in steel rails follow lines or seams which, under the microscope and in connection with chemical investigation, are shown to be manganese sulphide and his argument was sustained by numerous specimens of micro photographs. Dr. Fay calls attention to the fact that rail specifications generally have not included a limit for sulphur and he believes that the per cent. of sulphur in rail steel could be so reduced as to materially eliminate the injurious effects due to the manganese sulphide seams.

The next paper related to some results showing the behavior of rails under the drop test of S. S. Martin. This paper called attention to the various kinds of foundations which were used for the anvil on the rail drop test: (A) having oak blocks 18 x 18; (B) wooden foundation with steel blooms above, and (C) a concrete foundation with 20,000-lb. anvil. Numerous tests of from 85 to 100 lb. rails on different foundations showed that the permanent set due to a given drop was quite various. On Type (A) Machine 85-lb. section, with a 12-in. drop, produced no permanent set, and an 18-in. drop was required to give a permanent set of .062. On type C machine the 85-lb. rail under 12-in. drop received permanent set of .06. From the results of numerous drop tests on Foundations A and C this showed that there was a difference of 40 per cent. in the height required to give a certain permanent set. On account of the difference in subsoil, it is also necessary to have spring supports for the anvil similar to those under the M. C. B. Standard Axle Testing Machine.

The next paper related to Rail Failures and Split Heads, by M. H. Wickhorst, Engineer of Tests of the Burlington. Mr. Wickhorst attributes most of split heads to the effect of segregation and he presented a sample of a rail having split head and an investigation into the chemical analysis showed the carbon as high as .81, phosphorus .163, sulphur .152 and manganese 1.55 indicated excessive segregation. The tensile tests transversal showed a strength of 58,000 lbs. and no elongation, while the tensile test longitudinally showed a strength of 108,000 lbs. and an elongation of 5 $^{9}/_{10}$ per cent. His explanation of split heads is that they are due to an eccentric application of the load to rail wheels or the canting of the rail. On account of bad segregation and a weak condition of the metal, the material is unable to withstand such internal stress, a crack develops internally until it finally breaks through on the under side of the head.

The notes on the rail situation of E. F. Kenny covered largely the same ground already gone over in the address of President Dudley.

The discussion of the different papers was first by W. R. Webster, who said that some of the evidence presented showed the necessity of a deeper head. J. P. Snow was in favor of the extension of Mr. Howard's investigation into the physical defects of rails. R. W. Hunt claimed that many of the ideas which are now brought forward to improve rail manufacture had long been known, but were not used in modern practice. He and others had years ago advocated short ingots and had found that rails made from butts were of very good quality, also that the steel should be allowed to settle and give time for the escape of gas had long been known. The practice of cleaning the blooms and ingots from blisters was necessary, but it was often neglected. Vertical soaking pits allowed the metal in the ingot to remain liquid and unless a long time is allowed to solidify, there would be increased segregation. Captain Hunt gave a good historical account of the development of steel rail manufacture and claimed that modern practice was bad not on account of ignorance, but on account of the commercial pressure favoring more rapid production. He said that when there are conditions in rail manufacture where 35 per cent. of the product is imperfect, there was something wrong and it is impossible for inspectors to detect all of the bad material. He thought that heavy rails were generally not likely to be as good as those of the smaller section on account of the lack of work in rolling. As refrigerated blast makes better pig iron, it is expected that the refrigerated blast coupled to the Bessemer Convertor would improve Bessemer Steel.

A. Stevenson, of the Standard Steel Works, said that he had found that wheel and tire steel were subject to the same imperfections found in rails, that the wheel is heated by sliding and hardened by rolling and he had found incipient cracks in the flanges or tires the same as has been found in rails.

Mr. Onderdonk, Engineer of Tests of the Baltimore & Ohio, said that split heads were the principal causes of failures on the Balimore & Ohio and out of 10,000 tons during the first year 22 per cent. were removed for split heads. He had required 30 per cent. crop end which had reduced this 22 per cent. to only 1¾ per cent. removals the first year and $^{9}/_{10}$ of one per cent. in the second year.

Dr. Dudley closed the discussion by saying that conscientious, co-operative study and faithful work both by the railroads and the steel manufacturers would solve the rail problem. If it is found that the cost of rails would be greater, he believed that that consideration would be fairly met.

FOREIGN RAILROAD NOTES.

The Russian iron and machine works cherish hopes of important orders for the railroad down the Amoor, and evidently have no idea that supplies for it will come from America.

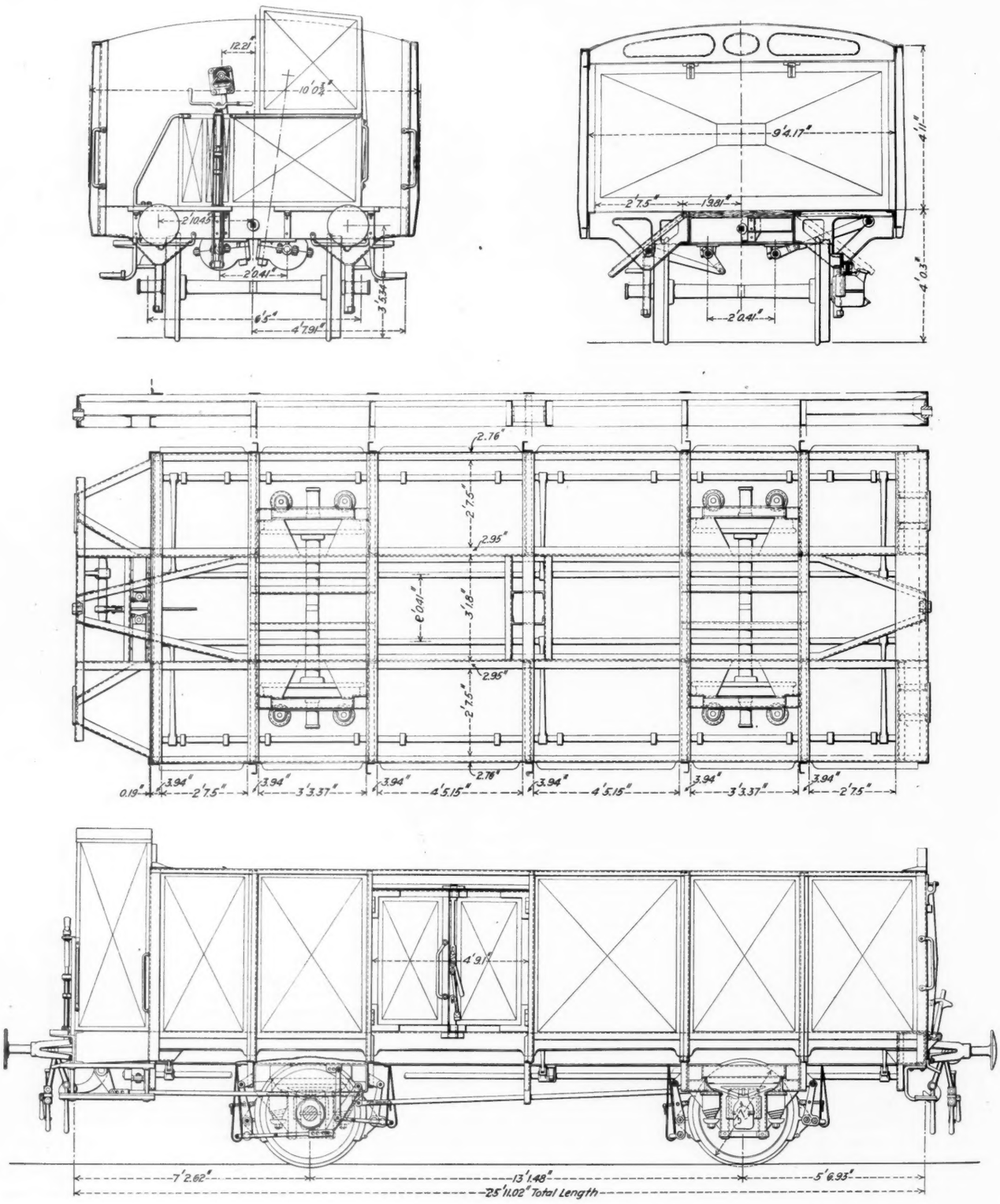
The Japanese are transforming the military railroad which they built from the Korean border to the seat of war south of Mukden into a standard-gage railroad, which, with their

railroad through Korea, will open a rail route from Europe to Japan, with the short steamer passage across the Straits of Shimonoseki.

Last February there were 2,728 locomotives constructed or under construction licensed to use Wm. Schmidt's superheaters. Of these no less than 1,588 were on the Prussian State Railroads (including 715 not yet completed). Other German states had 203; Belgium 140, besides 96 under construction.

GOOSSENS' SIDE DUMP CAR.

A prize competition was recently held by the management of the Prussian State Railroads for 15-ton self-clearing dump cars. The car shown in the accompanying drawings, built by J. P. Goossens, Aachen, Prussia, was considered the best; a Krupp car was second, and the third and fourth places were taken by cars submitted by von Talbot, of Aachen. These four cars are to be tried in actual service, and the first three were awarded prizes of 5,000 marks ($1,250) each.



Goossens Self-Clearing Side Dump Car.

MR. ARNOLD'S REPORT ON THE SUBWAY SIGNALS.

The report of Bion J. Arnold to the New York State Public Service Commission on the efficiency of the New York City subway railroad was largely reprinted in the *Railroad Gazette* of May 29. From the preliminary report, giving details of the signal system and of what is proposed in the way of improvement of the block signaling, we give herewith such parts as are of general interest.

Having given a brief description of the system, in which he says that the apparatus is well maintained, Mr. Arnold continues:

The system as maintained in the subway is remarkable for the few failures that have occurred and the excellent performance that has been obtained. According to the records kept by the Interborough Rapid Transit Company during the two years extending from October 1, 1905, to October 1, 1907, there were 155,064,894 signal and stop operations with 497 failures, or one failure to 312,001 of block and interlocking signal and automatic stop movements. The causes of the 497 failures are as follows:

Causes of failures.	Totals.
Alternating-current relays	5
Broken wires	33
Broken track wires	12
Resistance grids	2
Careless repairmen	17
Circuit breakers on signals	20
Direct-current relays	29
Fuses	46
Insulated joints	143
Loose wires	11
Low alternating current	16
Low direct-current	4
Low air pressure	8
Renewing rails	4
Transformers	3
Trains run by signals	3
11,000-volt mains burned	7
Third-rail short circuits	13
Trackmen	25
Unknown	4
Short-circuits on track	41
Lamps out	1
Signal valves	2
Resistance tubes	1
Water in signal case	1
Defective magnet	1
Stones	7
Shifting ties	7
Circuit-controller springs	11
Frozen valves	2
Stop cylinders	3
Out of adjustment	6
Loose air pipes	1
Gate valves closed	5
Broken air pipes	3
	497

The failures occurring to the interlocking apparatus for the 36 interlocking plants in use during the two years from October 1, 1905, to October 1, 1907, are as follows:

Broken wires	15
Frozen valves	1
Indication springs	21
Loose wire	1
Obstructions in switch points.	19
Out of adjustment	21
Switches run through	24
Switch frozen	1
Broken connections to switch.	2
Short circuits	10
Locking catching	2
Careless repairmen	6
Unknown	1
Rails running	2
Careless signalman	1
Circuit shifter	1
Burned cable	1
Burr on rail	1
Binding on ties	1
	131

For the whole signal system, all situated within a territory about 15 miles long, and including 761 home, distant and dwarf signals, there are 1 supervisor, 2 inspectors, 32 repairmen, 7 assistant repairmen, 5 miscellaneous men on maintenance and 1 storekeeper.

In practice it has been found that in order to insure safety of operation, it is not sufficient simply to provide ability to "see ahead." Accidents occur which can only be explained upon the theory that the motorman failed to exercise this ability. In case the motorman should fail to obey a signal, means that are independent of him must be provided to control the movement of the train. The system in use in the subway accomplishes this by an automatic trip situated at the side of the track, which, by opening a valve on the train pipe of the air-brake system of the train causes the brakes to be set. This automatic stopping device makes it necessary that the motorman shall act consistently with the indications of the signals, for in case he fails to do so it not only suddenly stops the train at considerable inconvenience to the passengers, but also reflects upon his record as a competent man.

From the above it is clear that the automatic stopping device is intended to render the safety of the train independent of the motorman's intelligence or judgment. This is now true so long as the train is proceeding between stations. When, however, a stopping point or terminal is being approached with the system as now installed, the intelligence and judgment of the motorman become essential factors in the safety of the train movement.

To facilitate the movement of trains, the practice in the subway has been to treat all stations as terminals, in so far as the motorman's control of his train is concerned. It is, therefore, assumed that a proper reduction of speed preparatory to stopping at these stations will be made by the motorman. As a consequence, the distance to which the motorman can see ahead by means of the block system is reduced in accordance with the conditions determined by the speed at which he *should* approach this stopping point. Since the automatic stopping devices are placed with reference to and are controlled by the block system, it follows that, if the motorman neglects to observe this reduction in speed, due to any cause whatsoever, it would not be possible for the automatic stopping device to prevent a collision with a train standing at the station. Although the original installation of the block system was such that safety was obtained at all points, the congestion due to the long delays at the station platforms caused changes to be made in the station blocks on the express tracks. These changes were based upon the assumption that a reduction in speed would be made when trains approached stations, and it therefore follows that safe automatic control of trains is not now always obtained. In other words, the motorman's intelligence and judgment as well as his physical condition now enter as factors in the safety of train movements, particularly when approaching stopping stations.

To maintain a uniform standard of safety over the entire subway it is necessary to introduce some device that will insure this reduction in speed when approaching a stopping point.

Since safety in operation requires that trains be kept a certain distance apart, and since to secure this and at the same time not to make the distance between trains any greater than necessary, the blocks with the distant signal placed on the same post with the home signal have been made of a length equal to the braking distance plus 50 per cent. This 50 per cent. may be considered as a margin or factor of safety to cover contingencies and unusual conditions of operation, which would tend to increase the distance ordinarily traveled by a train in coming to a stop. The effect of grades has been considered, as the distance in which a train may be stopped will vary according to the grade. Since it is necessary to reduce speed at curves and when approaching stations where stops have to be made, the actual length of block employed has been worked out for each location. With the idea of ascertaining the practical results obtained in this connection, many motormen were questioned. The inquiries did not disclose a single case where a train, automatically stopped by a "trip," had not been brought to a stop before the next signal had been reached—the trains running about two-thirds the length of the block—thus showing that the block system gives the protection between stations that it was originally designed to provide.

The block system as installed has been so arranged that at all points, except at stations, trains will be separated a minimum distance of one block, and to secure this, use has been made of what is known as an overlap, or the overlapping by one signal of the section of track governed by the next signal in advance, so that there will at all times be two block signals in the rear of a train to protect it by indicating stop. Without the overlap a train might stop with the last car a few feet in advance of the signal at the entrance to a block, in which case should a following train run by the home signal, although the brakes would be applied when the train passed the signal, the speed would not be reduced sufficiently to prevent a collision. This would now be the case at stations should a train run past the home signal at full speed.

At stations on the express tracks where all trains make the station stop, trains are required to slow down on approaching these stations, and as the speed is reduced the train may be brought to a stop in a much shorter distance than if running at full speed, the overlap at these places has been made an average length of 350 ft., the exact length at each place varying slightly according to the grade and curvature. In each case this overlap is so arranged that a train standing at the platform will have cleared the overlap and allowed a following train to approach the home signal immediately in the rear.

The use of the overlap and the spacing of trains consequent thereon is necessary in order to use the stopping device which has been provided automatically to apply the brakes should a train run by a home signal that is indicating stop. This automatic stop is arranged to operate in connection with the home signal of the block in advance, the stop going to

the position to stop a train when the rear wheels of a train pass out of the block, and is occupying the overlap section only. The principle, therefore, is to provide at all points sufficient distance between the rear end of one train and the home signal when indicating stop, will be automatically head end of the next train, in which a train passing by the stopped by the brakes without coming into collision with the train ahead. The automatic application of the brakes is independent of the motorman, and when the brakes have been so applied the train must be brought to a stop before the trainmen can get at the valve on the car trucks to close it, and allow the train to proceed.

The following information obtained from observation of the movements of trains in the subway is of value in considering the improvements which are recommended in this report.

The highest observed speed of a number of observations was 40 miles per hour.

The usual speed of express trains at places favorable for fast running was 35 miles per hour.

The usual speed of heavily loaded northbound express trains leaving Brooklyn bridge exclusive of slowing down when approaching stations was 32 miles per hour.

The minimum possible time interval between trains at the various blocks as now installed, based on the assumption that a following train will in each case pass the distant signal on the instant that such signal indicates proceed, and as determined upon express trains is as follows:

Minimum Times Required to Traverse Block Sections Between Brooklyn Bridge and 96th Street.

Northbound								Southbound							
Brooklyn Bridge to 14th St., 11 blocks.		14th to 42d St. station, 8 blocks.		42d to 72d St. station, 12 blocks.		72d to 96th St. station, 6 blocks.		96th to 76th St. station, 6 blocks.		72d to 42d. St. station, 12 blocks.		42d to 14th St. station, 8 blocks.		14th to Brooklyn Bridge, 10 blocks.	
min.	sec.	min.	sec.	min.	sec.	min.	sec.	min.	sec.	min.	sec.	min.	sec.	min.	sec.
1	14	1	15	1	20	1	23	1	14	1	24	1	20	1	13
1	7	1	9	1	29	1	12	1	9	1	9	1	6	1	7
1	0	0	59	1	20	1	10	1	1	1	8	1	3	1	3
1	0	1	0	1	25	1	6	1	0	0	55	1	0	1	1
0	58	0	59	1	9	1	0	0	50	0	57	0	57	1	8
1	9	1	3	1	7	1	12	0	54	0	55	0	48	1	7
1	5	1	1	1	0						58	0	54	1	4
1	7	1	3	1	5					1	4	0	60	1	5
1	5			1	2					1	21			1	7
1	11			1	0					1	22			1	5
1	18			0	54					1	22				
				1	0					1	4				

This shows that if it were not for the station stops, trains could be operated over the express tracks of the subway under a headway or time interval between trains of 82 seconds and that a 90-second headway is practicable.

The following data, regarding movements of trains at express platforms of the Grand Central Station between the hours of 5 and 6 p.m., was obtained soon after I began to study conditions in the subway:

	Northbound.	Southbound.
Trains per hour	27	29
Average time between arrival of trains	2 min. 12 sec.	2 min. 1 sec.
Average length of stop	58 sec.	35 sec.
Shortest stop	25 "	25 "
Longest stop	82 "	62 "
Average delay to trains that were stopped at signal 47 in rear of platform	33 "	..
Av. delay to total trains passing signal 47	26 "	..
Av. time required for train starting at signal 47 and head end reaching edge of platform, a distance of 390 ft.	23½"	..
Av. time required for train starting at signal 47 to run a distance of 763 ft. and make a stop at station platform	44½"	..

At the southbound express platform at Grand Central Station, the following delays occurred between 8 a.m. and 9 a.m. at signal 6Ra, which is immediately in the rear of the platform:

Trains per hour	29
Average interval between arrival of trains	2 min. 1 sec.
No. of trains stopped at signal in rear of platform	20
Average delay to trains stopped at signal	28½ sec.
Average delay to trains passing signals	21 sec.

These figures indicate that under present conditions it is hardly possible to maintain a two minute headway upon the express tracks during rush hours. Some improvement has been secured recently by introducing minor improvements and the use of trained platform men in police uniforms, but there are still times during the rush hours when the rate of train movement falls as low as 27 trains per hour, although this condition does not now continue for a full hour, as was formerly the case before efforts were made to control the loading of passengers.

CUMULATIVE EFFECTS OF DELAYS.

Every effort should be made to limit the station waits as the movement of the trains is extremely sensitive to delay. In order to understand how even one prolonged station wait has a cumulative effect on the scheduled movement of the trains, we may take for an example an express train going north during the rush hours. This train may be held at Brooklyn bridge until all the seats are taken, and part of the standing room is occupied. The train may be held again at the Fourteenth street platform until each car is practically crowded full. This train then reaches Grand Central Station, where many of the passengers wish to get off, either to leave the subway, or to transfer to local trains. It is necessary for these leaving passengers to crowd through the passengers standing in the ends of the cars and on the car platforms, and then almost to fight their way out of the cars through the crowd which is endeavoring to board the train.

This enforced delay at Grand Central Station causes the train to occupy the station block for more than its allotted time, and the caution signal at the rear of the station slows down the following train. The first train in leaving the station platform requires 23 seconds to run the length of the platform and give the proceed signal to the following train, which, because its speed has been reduced by the caution signal, takes a greater length of time than normally, to come to rest at the station platform. As the interval between trains has now been slightly increased, there are more passengers to board the second train than would be the case if the interval between trains had been maintained at two minutes. The delays caused by the two trains are now transmitted by the block system to the next following train, so that this third train must come to a full stop at the home signal at the rear of the station platform. In order to enter the station after it finally gets the proceed signal, this third train must start up a grade and proceed around a curve, which adds considerably to the length of time required to clear the station block. This additional delay is added to the delay of the first two trains, and transmitted by the block system to the fourth train. In other words, the first delay at the station platform causes other cumulative delays, which are often more serious than the original delay, and the result is that the headway of all the trains is lengthened, and the car hour capacity of the subway is quickly reduced. If these delays continue, the effect is soon felt back at Fourteenth street, and as the trains are held at the Fourteenth street platform by the blocked condition of the track between Fourteenth street and Grand Central Station, an opportunity is afforded greatly to overload these delayed trains, and this again adds to the congestion.

(To be continued.)

THE AIR BRAKE ASSOCIATION.

The fifteenth annual convention of the Air-Brake Association was held at St. Paul, June 9, 1908, President G. R. Parker presiding. President Parker in his opening address referred to the new brake problems continually coming up for solution. These must have prompt action if the work of the convention is to be satisfactory. The President pointed out in considerable detail what constitutes a good air-brake man and the strenuous efforts which are required to become a well qualified air-brake inspector, and to qualify oneself to impart knowledge to others. The manufacturers have been endeavoring along divergent lines to meet the changed conditions and additional requirements by placing on the market several new automatic brake devices, which in some respects are a complete departure from previous practice, but the results have fully met expectations. The improvements have established more reliable and prompt action with higher efficiency.

Attention was called to the closer relations between the Interstate Commerce Commission and the railroads and the good results from complying with the requirements of the law. The President quoted freely from Mr. F. W. Sargent's papers on brake-shoes presented at the 1907 convention of the M. C. B. Association which contains amazing figures as to the cost of keeping the locomotive and car wheels in America

properly shod. Over 230,000 tons of brake-shoes are used annually at an initial cost of $8,550,000. Mr. Sargent recommended flange shoes for all steel-tired engine-truck, tender and coach wheels, but the wisdom of this was questioned by the speaker.

Touching on the question of what should be construed as "air-brakes in good condition," the speaker said that it was a conspicuous fact that air-brakes on cars owned by companies having level lines and which are considered in good condition are practically defective for service on mountain grades. There must be improvement to enable lines with mountain grades to comply with the law and handle trains with the required factor of safety.

Pressure retaining valves are a most essential part of air-brake equipment, and their use on mountain grades is absolutely necessary. Another matter is the proper relation between available brake power and total load on wheels. The brake power should not be less than 25 per cent., but it is not uncommon to find cars with only 17 per cent. used for brake power, based on what has been considered the standard brake-pipe and brake-cylinder pressure. The aims and purposes of the association would be greatly helped if it could cultivate closer affiliations with the M. C. B. and M. M. Associations. Standing committees should be appointed and be in position to confer with one another at any time.

Following the President's address the Secretary reported that 172 members had joined the association during the year, making a present membership of 850; and there is a balance of $1,770 in the treasury.

A letter from the M. C. B. Association was read asking what recommendations the Air-Brake Association had to make on the question of hose and couplings and automatic couplers. The discussion disclosed that many railroads provide trains with "dummy" hose which would permit the coupling of the brake-pipe and air signal hose, making possible the use of the signal-pipe under a car having a disrupted brake-pipe, thus insuring the operation of the brakes on all cars excepting that having the disabled pipe. Sometimes the brake-pipe and air signal couplings are forced together to provide such connections. The consensus of opinion was that brake-pipe and signal couplings should never be forced together. The respective couplings should be so designed as to make a union impossible.

A motion was also made and carried that the attention of the M. C. B. Association be called to the importance of having hose couplings made with a standard size of groove and that standard size gaskets be used. A further discussion of the coupler question brought out the statement that the dummy coupling now in litigation was used on the Louisville & Nashville some three years before the date of patent of the device.

A representative of the Interstate Commerce Commission called attention to the importance of having an automatic air and signal line coupling, as it was only a question of time until the laws would compel something of the kind.

The first paper presented was a committee report on Brake Pipe Leakage. The committee recommended that on steel cars with brake-piping passing through end sills, the angle cock should be located a sufficient distance from the sill to prevent the cock from being broken off in switching, and that the practice of using home made coupling groove cleaning tools should be discontinued.

The committee favors the lengthening of the brake-pipe at each end of the car at least 2 in., as with heavy locomotives and long trains the excessive slack between cars sometimes causes partial uncoupling of hose, thereby increasing leaks. The committee suggests a form of hose coupling gasket with increased width of face, without reducing the area of the opening and which will fit the present standard hose coupling.

Experiments were made by the committee to determine the causes of stiff or frozen hose. It is believed that if the M. C. B. hose did not absorb and retain moisture it would not freeze and in turn cause serious leakage. Nothing of a conclusive character had been learned from the experiments other than that as compared with new hose under similar conditions, the increase in absorption of old hose was very marked. In the discussion following the paper it was pointed out that among the causes of serious brake-pipe leakage were the use of improperly tapered pipe fittings and pipe threads, a lack of extra heavy nipples behind the angle cocks to withstand the strain and the use of old hose couplings which should be scrapped.

The business of the second day of the convention opened with the reading of a letter from Secretary Moseley, of the Interstate Commerce Commission, in which he spoke of the valuable work of the air-brake men and the great benefit derived by the commission through having its inspectors attend the air-brake conventions.

The second paper read was on Tests for Brake Cylinder Leakage. The committee finds there is a considerable difference of opinion regarding the manner in which these tests should be made. Little, if any, reliable data has been obtained from which a conclusive and practical test can be formulated. A tabulated statement is given of 18 tests showing brake-cylinder leakage, the average being slightly less than 2 lbs. a minute. The paper concludes by giving 5 lbs. as the permissible maximum leakage per minute for passenger equipment cylinders. For freight cylinders a ¼-in. inward movement of the piston in three minutes denotes excessive leakage.

A motion that passenger and freight brakes be subjected to the same test did not prevail and the subject was finally carried over for another year with a recommendation that the suggestions of the committee be tested out.

Paper No. 3 was on Breaking in Two of Long Passenger Trains. Long trains with inferior draft gear, handled by locomotives having a drawbar pull of 45,000 lbs., are subjected to hard usage, especially when managed by inexperienced engineers or when double heading in winter. With long modern passenger trains, weighing 400 to 700 tons, run at comparatively high speed and required to stop frequently, prominent underlying causes of brake trouble are unequal piston travel; ports or pipe of retaining valve obstructed; inferior repair work on triple valves, or lack of cleaning and lubrication, occasionally causing brakes to apply in undesired quick action; lack of facilities for testing brakes on outgoing trains at large terminals; locomotive equipment not properly maintained; heavy locomotives having brakes on driving wheels only; engine and tender brakes cut out. Break-in-twos should not be attributed merely to undesired quick action; investigation should be made to locate the actual cause.

A defective triple on dining or private cars is particularly dangerous because such cars are handled in many different trains. The committee opposes reducing the brake-pipe pressure from 110 to 70 lbs. with a view to preventing undesired quick action, as that does not permanently remove the cause.

The fourth paper read was on Brake-Beam Release Springs. A paper by Mr. W. H. Marshall in 1894 covered this subject pretty well. Since that time there has been a material increase in the weight of passenger equipment cars with larger brake cylinders and heavier foundation brake gear. The automatic slack adjuster has also taught the desirability of keeping the total ratio of leverages as low as possible and within certain specified limits. The committee makes the following suggestions:

For eight-wheel passenger cars: Inside hung brakes without brake-beam release springs. Connection between live and dead levers to be located above the center of the brake-beams. Strut of brake-beam to be lengthened to allow an increase in distance from face of shoe to center of lever pin hole. Brake hangers to be of ample length to allow for shoe and tire wear, without causing a radical change in the angle of suspension. Angle of brake hangers to subtend 90 deg. with a line drawn through center of wheel and center of shoe. Brake hangers to be suspended from a point that has a fixed vertical relation to wheel where possible.

For 12-wheel passenger equipment cars: If all brake-beams were located on the same side of the wheels of the truck, the release effect would be uniform in one direction, and the use of brake-beam release springs might thus be rendered unnecessary.

That the brake-beams be entirely dispensed with, and that brake-shoes be applied to both sides of the wheel similar to the "Beals" design of driver brake. Vertical instead of horizontal system of all body levers similar to practice on some English rolling stock. Supports for the horizontal system of body levers be made swinging instead of riding upon carriers. That the release spring at present added to the body lever system be entirely dispensed with.

It is the opinion of the committee that if suggested improvements will not allow of the entire elimination of the brake-beam release springs, that wherever such springs are found necessary the springs should be adjusted so that each one will not increase the resistance of the brake-beam upon which it bears more than 25 lbs.

The discussion disclosed that the paper met with hearty approval. The generally low braking force of hand-brakes on heavy cars was commented on, also the decided improvement in this respect with the use of independent hand-brakes which gives much greater braking force than is possible with the usual type of hand-brake gear.

A supplementary report on the subject of the last paper was read but its suggestions and conclusions were so much at variance with the opinions of those present that it was turned over to the Executive Committee for disposition.

The next paper recited the experience of a prominent western railroad with a device for automatically cleaning and oiling passenger car triple-valves and brake cylinders. Among the things stated as being accomplished with this device was that triple-valves over three years in service and brake cylinder packing leathers three and one-half years, had been disturbed only for examination; and the limit of time this method of self-cleaning and lubrication would maintain the parts in good condition had not yet been determined. The device is a simple one, placed in the brake-pipe branch to the triple valve.

The fourth and last day of the convention opened with a discussion of the "Revised Report of the Committee on Recommended Practice for 1907."

Various recommendations contained in the paper were considered with a view of possible modification and a number of changes adopted, though of a minor nature.

The officers of the association elected for the ensuing year are: President, P. J. Langan (D., L. & W.); Secretary, F. M. Nellis, Westinghouse Air-Brake Co., re-elected; Treasurer, Otto Best (N. C. & St. L.), re-elected.

SOME FEATURES OF THE PRESENT STEEL RAIL SITUATION.*

BY C. B. DUDLEY.

The Bessemer steel rail has a marvelous history. The outgrowth of an attempt to make wrought iron cheaply, it came in just at the time when the wrought iron rail was beginning to demonstrate its unfitness to stand the pounding of the larger locomotives of the day. It perhaps is not too much to say that the Bessemer steel rail has made the modern railroad possible, and that without it, or its equivalent, the world's development would be half a century behind its present advanced position. And yet, notwithstanding all its merits, and its wonderful record in the past, no candid mind can view the present steel rail situation and not be impressed with the thought that the steel railroad rail, or perhaps more comprehensively, the railroad track of to-day, is called upon to justify itself in the eyes of the public. No record of past success, however wonderful it may have been, will suffice to meet the present conditions. The changes in methods of transportation during the last quarter century, the increases in sizes of cars and locomotives, with the consequent increase in wheel loads, and in the strains produced, have made new demands upon railroad tracks, and especially upon the rail, as the most important element in the track. It is plain, we think, that modifications at some point, and possibly at many points, are essential, in order that the new conditions may be successfully met. The startling record of rail breakages which has characterized the past two or three years, the rapid wear, and the almost appalling deterioration, due to crushing and flattening, of rails in track, have produced an outcry against the steel rail which, seconded by the technical press, has culminated during the past two years in a charge of criminal negligence on the part of those engaged in the manufacture of this great essential of railroad operation. No one at all conversant with the situation can successfully maintain that the subject is not a pressing one, and I am sure that all will agree that there is necessity for calm, cool, dispassionate consideration of the various elements involved in the problem. Perhaps you will bear with me while I attempt to discuss some features of this most important and most interesting situation.

*From the presidential address before the American Society for Testing Materials.

And first let us briefly consider the changed conditions. It is surely not too much to say that in the past 25 years the changes in the conditions in which the rail is involved have in three respects been most noteworthy: First, the average speed of trains has been largely increased; second, the average wheel loads of cars have been increased 75 per cent. and of locomotives over 100 per cent.; and third, on some of the larger and more important railroads the volume of traffic has increased at least 300 per cent., and perhaps more.

The influence of increased speed on the life of the rail is not easy to estimate, nor indeed can much that is positive be said on this head. Undoubtedly some of the shocks which the rail must sustain are increased in severity by higher speed. This, we think, is clearly the case when a higher speed train passes over a loose joint. The end of the rail to which the wheel is approaching must have a more severe blow with a fast train than is given by a slower moving one. On the other hand there seems to be some evidence that for those strains, whose severity is affected by the length of time the load is applied, the increase in speed may not be so injurious an element. We are all familiar with the fact that on thin ice the boy who goes rapidly is less liable to break through and get a ducking than one who moves more slowly, and in exactly the same manner the quick stepper sinks less deeply into semi-plastic mud than the one who goes with slower, measured tread.

The increase in wheel loads is a more important matter. Without going into the mathematics involved, and ignoring the apparently unsolved problem as to whether the rail under a moving load acts exactly like a beam supported at both ends and loaded in the middle, there is seemingly fairly good evidence that all things else remaining the same, doubling the wheel load approximately doubles the strain in the metal. It follows, therefore, when wheel loads are doubled, either that the rail section and supports in use at the time must have sufficient margin in them to safely endure these doubled strains, or that some changes are essential.

The increase in traffic is also a very important matter. No point in the science of strength of materials, if we may use the expression, is apparently better established than that repetition of stress has a direct bearing on the life of the part so strained. There is much indication, and the evidence is rapidly increasing, that the life of a rail, not only as regards wear, but also as regards its freedom from disintegration and breakage, is a function of the number of wheel loads that pass over it. We are strongly inclined to the view, therefore, that we are on firm ground when we say that even though we grant that the rails made twenty to twenty-five years ago were good and gave satisfactory service, it is as clear as noonday that the changed conditions of the present day, especially the heavier wheel loads, and the increase in traffic, demand changes in the practices that were prevalent at that time. No one, we are confident, will dispute this position, and I doubt not every railroad engineer within the sound of my voice will say to himself, "we do not expect the old rail to be satisfactory under the new conditions; many changes have been made, and yet the rails are unsatisfactory."

Let us examine this matter a little, and ask ourselves the question plainly, what have the railroads done to meet the changed conditions? First and foremost, the weight of the rail per yard has been increased. As a matter of record it may not be amiss to mention the successive steps of this increase on one large railroad. Within my own memory and study of this subject the following weights of rail have been employed: 56 pounds per yard, 60, 67, 70, 75, 85 and 100. The increase is quite noticeable, the latest form being nearly double the weight of that first used. The battle of the sections, or the form in which the increase of weight has been disposed, will be referred to later on.

But it may be said, "It is granted that the weight of rail has been increased, but what evidence is there that the increase has been sufficient?" "Is not a rail weighing 110, 120 or even 130 pounds per yard essential to meet the strains produced by the changed conditions above referred to?" Upon this point it is possible to say that most careful studies have been made, using the best obtainable data, and making allowances for what is more or less unknown and uncertain, and that the studies indicate that the weight of rail to carry the

increased wheel loads has been increased more rapidly than the wheel loads, and that the actual strain in the heavier wheel loads is no greater than was the case in the lighter rails under the lighter wheel loads formerly employed. It may be added that if 12,500 lbs. per square inch is assumed as a safe working stress for such steel as rails are made of, the present 85 and 100-lb. rail shows stress well within this limit, even under a static wheel load of 80,000 lbs., with a dynamic augment of 60 per cent. of the static load. If these studies can be trusted, therefore, it would seem that so far as weight of rail is concerned, the railroads have done all that could reasonably be required to meet the changed conditions with which we are dealing.

But again it may fairly be asked, we think, whether increase in weight of rail is all that is required. No principle of structural construction is better established, apparently, than that the support which material under strain receives is an essential element in its successful behavior. The rail alone cannot carry the load. It must be properly supported, and perhaps—mind you, I say "perhaps"—failure to properly support the rail may account for some of the rail failures of which we have heard so much during the past few years. Good railroad track involves a properly drained sub-grade, ballast, ties and rail fastenings, splice bars, and other joint material, and the proper maintenance of these, as well as rails. In other words, the rails are only one of the elements in the problem; I grant you, the most important one, but still not the only one. It would be manifestly unfair to blame the rail for failures which may be clearly due to defective support or fastenings. What, then, have the railroads done during the past fifteen to twenty years in the way of supporting the rail, to enable it to successfully meet the changed conditions we are discussing?

First, as to ties. It is well known that with the advent of the heavier rail some railroads actually diminished the number of ties per rail. This may have been all right during the transition period, but it is manifest that the strain in the rail is increased by such practice. More recently, as the number of heavier cars and locomotives has increased, we believe the number of ties has been increased again, until now in the best tracks as many ties are used as can successfully be employed and leave room for tamping. It may not be amiss here to call attention to a characteristic of ties that bids fair to be of increased importance as time progresses. Owing to the continually diminishing supply of forest products, it seems fair to expect that the supporting face of the tie under the rail will gradually get less as the necessity for using smaller ties increases. This will clearly lead to an increase in strain in the rail, and may even now be an element in the problem. Perhaps the general use of a tie plate on wooden ties, or the development of an entirely successful steel tie, may obviate this difficulty before it becomes too serious.

The joint and the splice bar and fastening have received an immense amount of study during the past twenty years, and while it would probably be too much to claim that the problem has been completely solved, no accusation that the railroads have been idle in this respect can be successfully maintained.

The ballast holds the ties in place, distributes the strain produced by the load to the sub-grade beneath, and undoubtedly performs some function in drainage. Taken in general, it is undoubted that there has been gradual increase in ballast, as the wheel loads and traffic have increased. That it has reached the proper thickness yet, even on those tracks which are best maintained, we fancy no one would be willing to affirm. We believe there are engineers who think that twice or even three times the present standard thickness of ballast is requisite, in order that the load may be properly distributed over the supporting surface beneath.

The sub-grade is the foundation and as such is unquestionably one of the most important elements in the problem. No amount of money spent on rails, ties, splices and ballast will give successful results, on an inferior sub-grade. Our belief is that the importance of the sub-grade has not been sufficiently appreciated by engineers in the past. Indeed there are indications that rail failures are a question of geography. The same rail, with the same locomotives and cars, and the same density of traffic, will have far less failures if the sub-grade is sandy, porous and well drained, than if the sub-grade is dense, heavy clay, which tenaciously holds water, and for quite a portion of the year may be called a more or less modified mud hole. The great enemy of the trackman is water, and our firm belief is that if more study had been put on the problem of keeping water out of the sub-grade, fewer rail failures would have characterized the past.

The maintenance of track, that is the amount of money and labor put upon the track to keep it up to its work, tamping ties, screwing up track bolts, keeping up renewals, giving heed to drainage, etc., has necessarily increased as the wheel loads have become heavier, and the density of traffic has increased. I know of no evidence that indicates that there has been a blameworthy falling off in any of these respects, with the advent of the heavier rail. It is undoubtedly true that track expenses, even with the same maintenance of line and surface, show a tendency to diminish, the heavier the rail. It is easy to see why this should be so, since the heavier and stiffer the beam, the more the strains produced by the moving load are distributed, and consequently the less need that money should be spent to cause each minute part of the support to do its maximum duty.

And this brings us to an exceedingly interesting phase of the rail problem. During the past year or two, in discussions and committee meetings over rail specifications, the desire on the part of some railroad engineers has occasionally cropped out, to have a rail of minimum weight per yard, and yet so good that even though the track might not always in every detail be kept up to standard there would still be no failures. According to their view if the rails were what they should be, inferior track maintenance would be a very small matter. And singularly enough, it seemed to be a little difficult for these engineers to see that this unloading of the whole problem upon the steel rail manufacturers was not entirely legitimate and praiseworthy. We hope to pay our respects to the steel rail manufacturers a little later, but we are compelled to say that this view of the case does not commend itself to us, and that we do not think responsibility can be so easily shifted to other shoulders. No one can be more desirous of good rails than we are, but failures in track maintenance cannot, we think, fairly be put upon the rail. On the other hand, we do think there is a legitimate question connected with this phase of our subject. This is, the requisite safety being always maintained, where does true economy lie in this contest between the rail and the track maintenance? There are three possibilities.

(1) Would better rails with the same weights per yard as are now in use, even though obtained at increased cost, result in such diminution of track expenses that economy would result?

(2) Would the same so-called inferior grades of steel that are now being furnished, with increased weights per yard, it being conceded that increased weights per yard are not essential from the standpoint of strains, result in such diminution of track expenses, that economy would follow after paying for the increased weights, and

(3) Would better steel and increased weights per yard, at even still greater cost, be followed by such saving in other track expenses that it would be true economy to obtain such rails?

We do not believe the data exists at the present time that would enable a satisfactory answer to be given to any one of these three questions. And yet they seem to us to open up an extremely important field. It costs a certain amount each year to maintain a mile of track, including rail renewals, and we have never seen any figures that show that the distribution of the expense to each item is such that the sum total is a minimum. Perhaps better rails, perhaps heavier rails, perhaps the two combined, even at greater cost for rails, would bring about this desired result.

Returning now to our query as to what the railroads have done to meet the changed conditions produced during the last 20 years or more by heavier wheel loads and increase of traffic. It is difficult to see how any fair minded person can think that the railroads taken generally and as a whole have not made a sincere effort to meet these changed conditions. It is granted that the action taken may not always have been the wisest action, that failures and mistakes have been made, and, indeed, it is undoubted that at times and places more vigorous action should have been taken, and that too fre-

quently there has been a disposition to lay the whole burden upon the steel maker, and yet notwithstanding all this, it would, we think, be hard to maintain that there has not been much sincere, conscientious and faithful effort on the part of the railroads to meet the problems due to changed conditions, with which they have been confronted.

Let us turn now to the record of the steel rail manufacturer in this matter and ask ourselves calmly and dispassionately what has he done during the past 15 or 20 years to assist in meeting the changed conditions about which so much has already been said. Has he made better steel? Has he spent time and money and brain power in faithfully trying to improve his product? Has he heartily and earnestly cooperated with the railroad engineer in his efforts to secure safe transportation of persons and property?

Before trying to answer these questions let us spend a moment with this problem of responsibility. It has already been hinted several times that there are railroad engineers who would be quite willing to put the whole burden of rail failures on the steel makers, and on the other hand, it is quite as certain that the steel makers seem to have been not only willing, but as a matter of fact have again and again washed their own hands entirely of responsibility in this matter, and claimed that it was simply a question for the inspectors and engineers. We have heard them say in effect, not once, but many times, "Our mills are open to you. Here are the rails. Take them or leave them," thus practically putting the whole responsibility of accepting and using defective and inferior material upon those who from the nature of the case cannot know as well as the manufacturer which are good and which are bad, and who many times have no alternative but to take what they can get. Not so do we understand the relation between the producer and consumer. From the nature of the case, the producer has essential information that the consumer does not have, and on the other hand the consumer has essential information that the producer does not have, and it is only by working together conscientiously, honestly and harmoniously that the best results can be obtained. We do not understand that the manufacturer of any material for the use of a public service corporation, where safety to human life is involved, can properly assume an air of indifference, can hold back essential information, which he as the maker of the material has, and the consumer does not, or can justly fail to co-operate in every reasonable way to the end that only safe material goes into the tracks.

The making of steel rails for use under high-speed passenger trains is something more than a mere commercial proposition. Both the producer and the consumer have great responsibilities in this matter, and neither can lay them aside or shift them upon the other.

Coming back now to our query as to the behavior of the steel rail manufacturers during the past 15 to 20 years. We are frank to say that with the most sincere desire to be strictly fair in this matter, we cannot regard this behavior as eminently praiseworthy. There has been far too much antagonism, far too much holding back essential information, and far too great a failure to co-operate. Many within the sound of my voice will bear me witness that in conferences over steel rail specifications, it has many times been simply impossible to get such information from the representatives of the steel makers, as would enable critical points in specifications to be wisely decided. And this is not the worst of the matter. Within two years past, entirely reputable engineers of railroad companies, have said in my presence, that they had been told by rail manufacturers, that if they did not take the rails offered, irrespective of specifications and tests, they would not get any. Still further, if I may judge from my own experience, it is only within the past year or perhaps year and a half that it has been possible to have what might fairly be called a consultation with the experts of the steel rail makers, over any point that involved the quality of the product, in any conciliatory, co-operating way. Far too much we fear the manufacture of steel rails has been studied in the past, simply from the commercial standpoint.

And how about the steel itself? Is the steel that goes into rails to-day better or worse than that made 15 or 20 years ago? It is well known that there is a general belief among railroad engineers, that the steel in the rails to-day is nothing like as good as it was 20 or 25 years ago. We are not quite able to follow these critics to the extent that they want to go on this point. Our judgment is that in two respects there is reason to think the steel in Bessemer rails is inferior to that made 25 years ago.

(1) The larger ingots of the present day necessarily lead to increased segregation and in so far as segregation is a serious element in the quality of steel, there is little room for doubt that the steel in the rails of to-day is inferior to that made some years ago. We think it fair to say that there is need for further study as to how far segregation apart from internal physical defects with which it is so often associated, is a menace. We cannot help wishing that it was not in the rail to anything like as serious an extent as many analyses show it to be, but at the same time, if the ingot was thoroughly sound throughout, we should like to study segregation further before feeling willing to say the final word.

(2) In so far as the more rapid working of the Bessemer process which has seemed to characterize its full commercial development during the past twenty years or more, has led to incomplete action between the final additions and the blown metal, and to higher finishing temperatures in the finished rail, the metal must be inferior. The making of steel is a chemical process, and every chemist knows that all chemical reactions require time, and it is to be feared that Bessemer metal is, many times, cast in the ingot mold, before the reactions are complete. The effect of this is certainly bad. Sound ingots cannot be obtained in this way, and if the ingot is unsound, good rails cannot be made. Again we are quite well aware that high finishing temperatures are blamed on the rail section. Thin flanges by getting cool too soon, seem to make it impossible to roll the head at the proper finishing temperature, and it is to be confessed, that in as far as the section is responsible for too high finishing temperature, the steel maker cannot fairly be blamed. But for all other causes leading to too high finishing temperatures, it is difficult to see how the responsibility is to be shifted. Notwithstanding these, as we regard them, just criticisms of the later made Bessemer steel, it is undoubted that a large percentage of the output of rails of the last twenty years has been approximately as good as that previously made. We are inclined to think that those who so vigorously denounce the later made steel, forget the enormously increased traffic which these rails have carried. The lack of reliable figures showing comparative tonnage of the earlier and later made steel, is a very serious handicap in reaching a satisfactory conclusion in this matter.

But whether the earlier or later made steel is better or not, it is certain that the need of to-day is for a steel even better than that earlier made. The speed is greater, the wheel loads are greater, and the tonnage is greater, and the steel to successfully meet these changed conditions, should also be better. Do we find then that during the last twenty years, there has been real conscientious study on the part of the Bessemer steel maker, as to how to make better rails? Are the ingots any less unsound, and more free from shrinkage cavities, pipes, gas bubbles and blow holes? Have any of the suggested means of overcoming or minimizing segregation, and diminishing the pipe been tried on Bessemer ingots? Have any of the Bessemer steel rail manufacturers or their experts contributed something toward the solution of the problem of how to secure safer and better rails? Have they welcomed and seemed willing to fairly try suggestions that might possibly lead to improvements in their products? Have they willingly accepted more frequent testing, to the end that inferior material might be kept out of the tracks? In so far as they have done honest conscientious work in any of these directions, let all honor be given them. In so far as they have failed, let us not add to their shame by discussing this phase of our subject further.

Let us turn now to two or three other features of our subject: and, first, as to the sections. It has already been hinted that the section has been blamed for some of the difficulties encountered in making good rails. The makers have urged, and we think with good show of reason, that the distribution of metal between the head, web and foot of the rail, in many of the sections, was such that it was practically impossible to finish the heads at the proper temperature. And since the sections were specified by the railroad engineers, the rail makers have felt, and we think justly so, that in so far as the section was an element in good rails, they could not be held

responsible for poor rails. This criticism was felt to be so valid that within the past two years, two independent organizations have taken up the question of section de novo. One large railroad through a committee of its own officers, reinforced by practical rail manufacturers, and the American Railway Association, through one of its own committees, assisted also by a number of practical rail makers, have both, but independently, devoted much study to the section. The results of their deliberations have culminated in three types of sections. The one known as Section "A" of the American Railway Association, is characterized by a shallower head, wider base, with thin flanges, and a greater height of section than either of the other two. Regarded as a beam or girder, this section is undoubtedly the strongest section of the three. It is apparently advocated by those who think that more of the duty of the track should be borne by the rail, and less by the other elements. It is obvious, as has already been stated, that the stronger the rail, as a beam or girder, the more the strains are distributed, and the less need therefore, for exacting attention to the other features of track maintenance. Its advocates think that the distribution of metal between head, web and foot, is such that the rolling difficulties and especially the question of finishing temperatures, can be met with entire success. It would be a bold man who would be willing to affirm that this section will not ultimately prove to be the best of those under consideration, and especially that the transference of more of the duty to the rail, will not result as has already been indicated, in ultimate track economy. Those who oppose this section, fear that the shallow head is an element of weakness. According to their view, with such steel as it is at present possible to get in rails, the pounding of the heavy traffic will lead to such crushing and splitting of the heads, owing to internal physical defects in the metal, that the section will prove a failure, especially on roads with heavy wheel loads and dense traffic.

The second type of section, known as Section "B" of the American Railway Association, is modified to meet this latter view. The head is practically the head of the American Society of Civil Engineers' section, thicker flanges, less height over all, and the same thickness of web. The distribution of metal is believed, as in the "A" section, to successfully meet the manufacturers' criticisms, the head and foot having slightly over 40 per cent. each of the metal, and the web the balance. This section is confessedly a compromise, but there goes with it the hope that it will ultimately prove itself worthy of being adopted as the standard recommended section of the association. This section is weaker as a girder than the "A" section, but is believed to have sufficient factor of safety so that no difficulties will arise from this cause. These two sections have been proposed as "recommended practice" by the American Railway Association, and the question as to which is the better of the two, or indeed as to whether some other section is not still better than either, has been referred to the American Engineering and Maintenance of Way Association, an organization composed largely of railroad operating officers, to study and accumulate data, and make a report, after the sections have been tried in actual service.

The third section, known as the "P. S. Section" of the Pennsylvania System, is a step farther away from the "A" section. It has a still heavier head, a narrower base, thicker flanges, and the same thickness of web as the "B" section. The radius of the web is smaller, thus producing more of a buttress where the head and web join; the experience of the Pennsylvania System seems to be that with their heavy wheel loads and dense traffic, and with the grade of steel that it is now possible to get in rails, more rails fail from crushing and disintegration of the head, apparently due to the pounding of the traffic, than from any other one cause, and accordingly in this section the maximum effort has been made to strengthen the head in its weakest point. The distribution of the metal is satisfactory, and the strength of the rail as a girder or beam is practically the same as the "B" section, and is believed to be abundant for present conditions.

The question of the discard has occasioned many words during the discussions of the past two years, and we had almost said "bitter" words. There is material enough in this feature of our subject for a long paper. I fancy many of us had more positive ideas on discard three or four years ago than we have at the present moment. The more the subject is studied the more difficult it becomes, seemingly, to express a final opinion that we are willing to stand by. If every ingot solidified in the typical way, and was like every other ingot, the question of discard would be easy. But it would almost seem as though every heat of steel was a law unto itself, and was different from every other heat of steel, and nearly the same might be said of every ingot. The differences in temperature at the time of casting, the more or less incompleteness of the chemical reactions when the metal leaves the ladle, the differences in chemical composition of the different heats, the rate of pouring, the differences in the condition of the molds, the differences in rate of cooling dependent on surrounding conditions, the differences in practice at the different works, especially in the matter of covering and artificially cooling the top of the ingot, the length of time that elapses before the ingots are shipped, and the more or less fluid condition of the metal on the inside of the ingot when it reaches the first pass, to say nothing of accidents or mishaps that may occur in handling the semi-fluid ingots, all have an influence on the location of that part of the ingot which is supposed to contain the poorest of the metal, and which it is the object of the discard to prevent from getting into the rails.

In view of these uncertainties, we cannot but think that the position taken by the Pennsylvania System and the American Railway Association in their proposed specifications is the most reasonable one, viz.: to leave the discard to the manufacturers, and to safeguard the product by proper tests, especially by choosing the test piece from such a location, and making the rejections such that it will be to the interest of the manufacturer to voluntarily discard the metal which will not stand test. This has been our practice at Altoona for many years. We have a number of specifications for different steel products, in which the word "discard" does not occur, and never has. An illustration will perhaps make this whole matter clear. When our axle specification was issued the whole question of discard was most carefully considered, and it was finally decided to select one axle at random for test from each heat of steel, after the axles from that heat had all been made up, stamped with the heat number, and put in a pile by themselves, and further, if the test axle stood all the tests, all the axles made from that heat were accepted, and if not, all were rejected. After the specifications had been in operation a short time a manufacturer who had worked with us during the development of the specification said to me: "There is steel enough in each one of our ingots to make thirteen axles of the size you are now using. As a matter of fact, we only make and offer you for test nine, for if we should make the whole ingot into axles, and you should get for test one made from the steel which we now discard, you would condemn the whole heat, quite to our loss." We are firmly of the opinion that the matter of testing rails can be so handled as to give similar satisfactory results.

And this brings us to the question of tests and testing. During the past few years much light has been thrown on this subject, and the truth compels us to say that a situation has been found that in some respects would be ludicrous if it were not so near the tragic. Let us see what the conditions have been:

(1) The manufacturers have in many cases at least selected the rail end as sample for test. The specifications being silent on the selection of the test piece, they naturally have urged that there was nothing to prevent their doing this, and they naturally again have, so far as information can be obtained, chosen the best steel in the ingot for test. It is not claimed that all specifications have been so loosely drawn as to permit such a suicidal practice, but it is certain that some of them have, and that the practice has been in vogue.

(2) The best-two-in-three principle has pervaded many specifications, that is to say, if the first rail end stood test the heat was accepted, but if it failed a second was tested. If this likewise failed the heat was condemned. If on the other hand it stood test, a third was tested, and the fate of the heat was decided by the majority. It would almost seem as though the specification had been drawn, not with the idea of being sure that only good rails should be accepted, but with the idea of being sure that as many heats as possible should be accepted.

(3) Only one heat in five was tested, that is to say, as we understand the matter, if the rail end stood test, and the heat

was accepted, that acceptance carries four other heats with it. But singularly enough, if on the other hand, the heat was rejected, that rejection only covered the heat from which the test rail end came, and the four preceding or following heats, as the case might be, got another chance for their lives. The unsatisfactoriness of such a method of testing, it seems to us, must be evident to every candid mind that knows anything about the making of steel. As has already been stated, every heat of steel is a law unto itself, and there is no certainty that because one heat or blow is good the preceding or succeeding four are equally good, any more than there is a reasonable presumption that if one heat is bad the preceding or succeeding four are likewise bad. And while it is agreed that when everything is working well, successive blows from the Bessemer converter may be similar in many respects, it is not agreed that testing one blow in five gives any reasonable assurance that only good rails are accepted for use in the tracks.

We fancy the rather loose testing described in the three items above started in the earlier days, when the strain on the rail was far less than at present, and the traffic far less dense, and has been perpetuated, partly owing to inertia on the part of railroad engineers, and partly owing to the resistance of the rail manufacturers. The wonder is, with such loose, log-rolling testing as has been in vogue, not that there have been so many rail failures, but that there have not been more.

But this is not the whole story. Until quite recently the specifications have been equally loose in regard to the drop testing machine employed in making the tests. Weight of top has been carefully stated and the height from which it must fall has been given; indeed in some cases the foot-pounds of the blow are carefully given for each weight of rail, but it has apparently been forgotten that the anvil or support on which the rail rests when it receives the blow is a most important element in the problem. It has recently developed that at one steel works the anvil was a couple of ingots laid down side by side, with appliances for holding them in place, and supporting the test rail, the whole resting on boards placed on the ground. At another steel works the anvil weighed 8,000 lbs., and rested on boards, stones and gravel. One rail manufacturer recently said in my hearing: "As long as the railroads did not object why should we take measures to increase the severity of the test by putting in heavier or better supported anvils." It is gratifying to be able to state that some of the more recent specifications, while according to our ideas still far from satisfactory in the matter of testing, do show marked improvement in some of the respects mentioned above, and still better, that the rail manufacturers are co-operating in and actually suggesting some of the improvements.

A few words now in regard to some of the details of testing rails, and first in regard to the drop test. It is well known that many testing engineers do not favor the drop test for rails. To our minds, however, it is the only possible available one for the present, and the following considerations seem to us to have weight in confirming this view:

(1) It tests the whole rail in the condition in which it goes into the track instead of a small fraction of the rail, as is requisite in all cases of prepared test pieces.

(2) It is sufficiently rapid, so that even though every blow is tested there is no fear of delaying the output of the mills, while waiting for test pieces to be prepared, or for slower tests to be made. We have known of a case where, with sufficient force to handle the test samples, 55 tests have been made in half an hour on a modern drop testing machine.

(3) There seems little doubt that some of the strains or shocks which the rail actually receives in track are similar to those produced by the drop testing machine. This is, we think, clearly the case with a loose joint and a rapidly moving train. In case the track bolts have become loosened, the end of the rail, when the approaching wheel mounts it, certainly gets a blow similar to that given by the drop testing machine. We have known rails which have given long service in track to be broken in this way, and the fracture showed perfectly clean, sound metal.

(4) Finally, if the specification requires that the deflection be taken the drop test reveals a good deal in regard to the physical properties of the steel.

Second, in regard to the selection of the test piece. We fancy it goes almost without saying that this should always be made by the inspector. In regard to location of test piece it is of course understood that in shearing the ingot into rail blooms it is necessary to make the bloom from which the test rail end is to be taken a little longer than the others. It is therefore essential that the inspector or the specification should designate the bloom from which the test will be taken. Some recent specifications wisely, we think, designate the top bloom of the ingot for this purpose, it being generally understood that the so-called "pipe," if there be any, and the greatest segregation and physical defects, will be in this bloom. We may perhaps wisely call attention to the fact that if a cover and cooling devices are used on the top of the ingot when it is cast, the poorest steel in the ingot will not be near the top end of the top bloom, but more probably near the bottom end of the top bloom, so that if the inspector takes his test piece from the top end of the rail made from the top bloom, he will be more apt to deceive himself than if he has the test piece cut from the bottom end of the top bloom. We have sometimes thought, when inspecting the practices of casting and cooling ingots in certain works, that it would be better to take the discard between the first and second blooms.

Third, in regard to height of drop. We have always opposed extreme severity of tests. Owing to the defects in the anvil previously referred to, if indeed they have been general, it is apparent that but little information that is of value and that is safe to follow can be obtained from previous tests. Our own view is that something a little more severe than the rail will receive in actual service, enough for a reasonable factor of safety is all sufficient. The trouble is we do not know how severe the shocks in service are. Some recent tests of rails which had broken short off in track, made by the Research Committee of the Pennsylvania system, seem to indicate that a 15-ft. drop with a 2,000-lb. tup and a 20,000-lb. anvil, would have rejected two-thirds of those which failed in service; also that the 15-ft. drop actually broke as many test pieces as the 19-ft. drop, other conditions being the same. These tests should be much amplified before final conclusions can be reached, but as far as they go they seem to indicate that we must look to other causes than defective or poor steel for a portion of the rail breakages, and that extremely severe testing is not necessary.

The crying need of the hour is positive, definite information. Upon dozens of points no positive data exist. During the discussions of the past two years or more opinions have been as plentiful as leaves in autumn, but of positive, reliable, statistical information, or figures taken from properly kept records, there has been a dearth that was fairly oppressive. The steel makers have not been as deficient in this respect as the railroad engineers.

The time seems opportune for genuine progress to be made. The railroads through their organization, which in a sense speaks for them all, the American Railway Association, have taken hold of the matter with vigor and have developed a large amount of valuable information, and for the first time in my 25 years study of this subject the steel rail manufacturers have shown a less antagonistic and more conciliatory and co-operative spirit than has usually characterized them.

The specifications proposed by the Pennsylvania Railroad system and by the American Railway Association seem to us to represent genuine progress and to be worthy of most careful study and trial. While they may be said to represent perhaps the best than can be done until more positive knowledge is obtained he would be a bold man that would claim that they will ultimately be satisfactory or final.

Whether the Bessemer process can be so modified and improved as to enable it to furnish rails that will be entirely satisfactory under the heavier wheel loads and denser traffic of to-day and the near future, or whether the basic open hearth will soon be the source from which steel for these rails will be furnished are questions worthy of serious attention. Our own feeling is that if a small fraction of the time and money that has been spent in the past over the commercial development of the Bessemer process shall, in the next few years, be spent in getting sound ingots, free from blow holes, slag and manganese sulphide, if this shall be found to be as serious as it now looks, and in overcoming or minimizing segregation it will last for many years to come.

A. R. A. RAIL SPECIFICATIONS.

At its April, 1908, meeting the American Railway Association adopted as Recommended Practice specifications for Bessemer and open hearth rails. These specifications differ in some clauses from those for Bessemer rails submitted to the Association by the rail committee the previous October, which were published in the *Railroad Gazette* Dec. 20, 1907. The most important changes, together with parts of the committee's accompanying report, were published in the *Railroad Gazette* of May 1, 1908.

The following extracts from the adopted specifications for Bessemer rails are those clauses which differ from the October report.

1. *Process of Manufacture.*—(c) There shall be sheared from the end of the bloom formed from the top of the ingot, sufficient discard to insure sound rails. (All metal from the top of the ingot, whether cut from the bloom or the rail, is the top discard.)

2. *Chemical Composition.*—The chemical composition of the steel from which the rails are rolled shall be within the following limits:

Bessemer Steel Rails.

	60 lbs.	70 lbs.	80 lbs.	90 lbs.	100 lbs.
Carbon	0.37—0.47	0.40—0.50	0.43—0.53	0.45—0.55	0.46—0.56
Manganese ...	0.80—1.10	0.80—1.10	0.80—1.10	0.85—1.15	0.90—1.20
Silicon	0.10—0.20	0.10—0.20	0.10—0.20	0.10—0.20	0.10—0.20
*Phosphorus .	0.10	0.10	0.10	0.10	0.10
*Sulphur	0.075	0.075	0.075	0.075	0.075

*Not to exceed.

(When lower phosphorus can be secured, a proper proportionate increase in carbon should be made.)

Open Hearth Steel Rails.

	60 lbs.	70 lbs.	80 lbs.	90 lbs.	100 lbs.
Carbon	0.50—0.60	0.55—0.65	0.60—0.70	0.65—0.75	0.70—0.80
Manganese ...	0.75—1.00	0.75—1.00	0.75—1.00	0.75—1.00	0.75—1.00
Silicon	0.10—0.20	0.10—0.20	0.10—0.20	0.10—0.20	0.10—0.20
*Phosphorus .	0.04	0.04	0.04	0.04	0.04
*Sulphur	0.06	0.06	0.06	0.06	0.06

*Not to exceed.

(When higher phosphorus is used, a proper proportionate reduction in carbon should be made.)

3. *Shrinkage.*—* * * the temperature of the rails will not exceed that which requires a shrinkage allowance at the hot saws, for a 33-ft. rail of 100-lb. section, of 6½ in. and ⅛ in. less for each 10 lbs. decrease in section. No artificial means of cooling the steel shall be used between the leading and finishing passes, nor after the rails leave the finishing rolls * * *

4. *Drop Test.*—* * * the tup falling free from the following heights:

60, 70 and 80-lb. rail	16 ft.
90-lb. rail	17 "
100-lb. rail	18 "

One drop test shall be made on a piece of rail rolled from the top of the ingot, not less than 4 ft. and not more than 6 ft. long, selected by the inspector from each heat of steel. (Special or additional tests may be made at the discretion of the inspector.)

The temperature of the test pieces shall be between 32 and 100 deg. Fahr.

(a) If the test piece breaks without showing pipe, or physical defect, all rails from that heat shall be rejected absolutely.

(b) If, however, the test piece broken shows pipe, or physical defect, the top rail from each ingot of that heat shall be rejected, and

(c) A second test shall then be made of a test piece selected by the inspector from a rail other than that from the top of the ingot. If this second piece breaks the remainder of the rails of the heat shall also be rejected. If this second piece does not break the remainder of the rails of the heat will be accepted.

If the piece does not break under the drop test, it shall then be tested to destruction, and

(d) If, when so tested to destruction, the test piece shows pipe, or physical defect, the top rail from each ingot shall be rejected; the remainder of the rails of the heat will be accepted.

(e) If, when so tested to destruction, the test piece does not show pipe, or physical defect, all the rails of the heat will be accepted.

5. *Sections.*—An excess of $\frac{1}{32}$ in. in height of rails, and a variation of $\frac{1}{16}$ in. in width of flange will be permitted, but no variations will be allowed in dimensions affecting the fit of splice bars.

9. *Straightening.*—* * * in hot-straightening rails * * * they shall not vary throughout their entire length more than 3 in. from a straight line in any direction when delivered to the cold-straightening presses. * * * Supports of rails in the gagging press * * * to have flat surfaces.

10. *Branding.*—* * * Rails to be lettered consecutively "A," "B" and "C," etc., the rail from the top of the ingot being "A." In case of a top discard of 20 or more per cent., letter "A" will be omitted. All rails marked "A" shall be kept separate and be shipped in separate cars.

12. *No. 2 Rails.*—The October specifications provided that No. 2 rails be accepted up to 5 per cent. of the entire order. This is omitted in the revised specifications. No. 2 rails shall not be accepted for shipment which have flaws in the head of more than ⅛ in., or in the flange of more than ¼ in. in depth. No. 2 rails must be kept separate from No. 1 rails and shipped in separate cars.

TRAIN DESPATCHERS' CONVENTION.

The first session of the twenty-first annual convention of the Train Despatchers' Association was held in the Tarrant County Court House, Fort Worth, Tex., on Tuesday, June 16, 1908.

President C. H. Mullinix having not yet arrived, ex-President F. X. Meyers was elected temporary chairman. Hon. J. W. Samuels, of Fort Worth, welcomed the despatchers on behalf of the state. One entire session was devoted to the report of the Train Rules Committee. An addition to the first paragraph of Rule 4 of the standard code was recommended, making the sentence read: "But when a schedule of the preceding time-table corresponds in class, number, direction, day of leaving and initial and terminal stations with the schedule of the new time-table, a train authorized by the preceding time-table will retain its train orders and assume the schedule of the corresponding number of the new time-table, *which thereby becomes effective*," the addition being in italics. The amendment is designed to expressly validate the new schedule, which, in the present standard code rule is valid only by implication.

Rule 220 of the standard code was recommended to be amended by adding the words: "and also whenever the existence of any train expires by limitation," these words being designed to make clear the fact that when an extra train reaches the end of a stated run and the engine receives a new running order to a farther point, or when a work extra is directed to work until a certain time stated, all orders held by, issued for or relating to such train become void, as in the case of a regular train reaching its scheduled terminal station becoming 12 hours late or being annulled.

The recommendations of a year ago as to the desirability of a "schedule fulfilled" and an "office closed" special signal and of an identification device to be carried on all trains, especially passenger trains, were reaffirmed.

It was also resolved, in view of the success of the so-called A. B. C. or Beamer rules on a 67-mile division of the Northern Pacific and its authorized extension over two entire divisions of that road, to take effect in the immediate future, that the Association regarded these rules as deserving the attention of railroad managements.

The entertainment committee had arranged a series of programmes which added greatly to the interest in the convention. In addition to several social functions in Fort Worth, some 85 members and ladies enjoyed the trip to Galveston on the Katy Flyer for a full day's sight-seeing and bathing.

The annual election resulted as follows: President, Carl A. Mitchell, N. Y., N. H. & H., Hartford, Conn.; Vice-President, T. D. Dellmin, L. S. & M. S., Youngstown, Ohio; Secretary-Treasurer and Editor, J. F. Mackie, C., R. I. & P., Chicago (re-elected); Executive Committee, S. H. Brown, C. & A., Kansas City, Mo.; T. W. Fitzgerald, S. P., Sparks, Nev.; George B. Johnson, M., K. & T., Fort Worth, Tex.; G. W. Flynn, K. C. N.-W., Kansas City, Kan., re-elected.

The twenty-second annual convention will be held in Columbus, Ohio, on June 15, 1909.

METAL AND WOODEN FORMS IN CONCRETE CONSTRUCTION.

BY L. C. WASON,

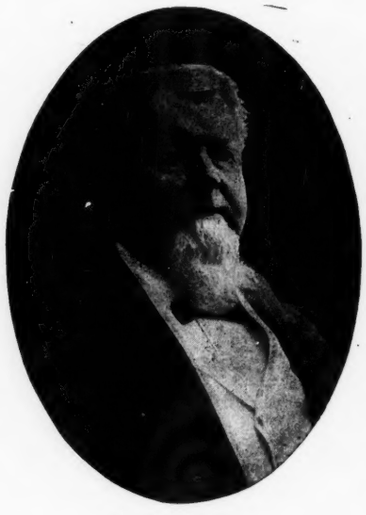
President of the Aberthaw Construction Co., Boston.

There is a great field for research and inventive genius in the production of cheap, durable forms sufficiently flexible for many different uses, as the cost of this part of the work is at present one of the greatest handicaps to the reduction of the cost and the more general use of concrete construction. The writer has used metal forms to some extent and has observed their use by other contractors. If sheet metal is placed on a wooden back or on a metal stiffening frame there is danger of its becoming dented, bent or otherwise defaced so as to give an imperfect surface to the concrete, and if the metal covering is sufficiently thick and strong to resist damage it is too heavy and expensive for general use. Moreover, such forms are not flexible, and cannot be used for varying purposes. The use of heavy cast-iron molds, as proposed by Mr. Edison, is still more expensive. Therefore, up to date, wood has proved to be the most economical and the most flexible in adaptability of anything which the writer has yet seen, and his study has been concentrated on the most effective and economical use of lumber. When a sheet metal form becomes dented it is usually cheaper to throw the covering away and start new than to straighten and re-use that which is bent. With the rough, careless class of mechanics calling themselves carpenters—the only kind which can be had for concrete forms—there is great danger of a rapid deterioration in the value of the material. Thoroughly good mechanics, who are capable of doing a nice job of carpentry, cannot be induced to work on this class of construction. The quality of these rough carpenters is also becoming poorer, usually on account of the trade unions' restriction to the employment of apprentices. Any man who can buy a few tools and use a saw and hammer can hire out as a carpenter. He is so poor a workman that he is constantly discharged, and after a considerable time of practising on one job after another may show a little intelligence, but is a very inferior workman at best.

The cost of construction as a whole is as likely to be governed by the cost of the forms as by the cost of the concrete. For illustration, in the cost of columns, although they are made so as to be reduced in size as easily as possible, this is somewhat expensive in labor, and after they are reduced the girders and beams which meet at a column are too short and have to be spliced out, which adds to the cost, and these costs are likely to exceed that which can be saved in concrete. It is therefore more economical to run the columns one size through the full height of a low building or to reduce the size only twice or at most three times in the height of a high building. For instance, the actual cost of labor (without regard to wastage of lumber) in reducing columns from 16 in. to 12 in. on a certain job amounted to $5.70, whereas the cost of the concrete saved by the reduction was $2.30. In the writer's office a set of plans in pamphlet form has been compiled for standard forms for all kinds of work, and where special framing is required plans are made for these special cases. Yet in spite of this care and study, the above figures represent actual experience. Therefore, in designing and handling form work, the cost of labor is the principal item to be considered. The opinion has been expressed that forms can be cheapened by the use of common and rough lumber instead of a fairly good grade of dressed lumber. The fact that it is almost universal to use a good grade of dressed stock would seem to disprove the above statement. The cost of dressing varies according to the mill from $1.50 to $4 per thousand feet for planing four sides. The price of second grade hemlock and spruce differs but little from that which has small sound knots and is free from wind shakes or large season cracks, and such lumber works so much easier that it cuts down the labor cost more than the equivalent of the difference in cost of material. Some builders use ⅞-in. stock, others 1½-in., and some 2-in. The thicker lumber will stand the wear and tear longer than the light and can therefore be used so many more times than the thin that it is more economical in the long run if the work in hand is large enough so that the forms can be used several times without delaying the rapid progress of the work. With planed stock tighter joints can be obtained between boards, which prevents leakage of the fine materials and weakening and roughening the surface, and the boards are of even thickness so that a fairly good surface is obtained which needs little treatment after the forms are removed except where an ornamental appearance is especially desired. If rough lumber is used, in order to get even a passable surface finish considerable labor must be spent upon dressing the concrete after the forms are removed, and this must be done by mechanics. If a cement finisher, who is in no sense a plasterer, is used, and his wages are 45 cents or 50 cents an hour, only a fair job can be obtained. If plasterers are used their pay is 60 cents per hour and the job is properly finished, but in either case the cost is greater than the cost of planing lumber and of using a good quality. Rough lumber can only be used economically in work which is never exposed to view or where the looks is no object whatever.

GEORGE H. DANIELS.

George H. Daniels, formerly and for 16 years General Passenger Agent of the New York Central, died at Lake Placid, N. Y., on July 1. Mr. Daniels was born in 1842 at Hampshire, Kane county, Ill. In 1857 he worked as rodman on an engineer corps of the North Missouri, now part of the Wabash, but his railroad career practically began in 1872, when he was appointed General Freight and Passenger Agent of the Chicago & Pacific, now part of the St. Paul. In 1880 he was made General Ticket Agent of the Wabash, St. Louis & Pacific, now the Wabash. Two years later he became Commissioner of the Iowa Trunk Line Association and also Commissioner of the Colorado Railroad Association. In 1884 he was made also Commissioner of the Utah Traffic Association, and two years later became Commissioner of the Central Passenger Committee. The next year he was appointed Assistant Commissioner of the Central Traffic Association and Chairman of the Eastbound Passenger Committee. In 1887 he was elected Vice-Chairman of the Central Traffic Association and Chairman of the Eastbound Passenger Committee. In 1889 he was appointed General Passenger Agent of the New York Central & Hudson River, and as the creator of the very efficient advertising department of that company became known throughout the world. He was relieved of the heavy responsibilities of the passenger department in 1905, and in May, 1907, resigned.



G. H. Daniels.

FOREIGN RAILROAD NOTES.

A report to the British Parliament showing the estimated position as regards capital expenditure of railroads in India under construction and the proposed expenditure during 1907 and 1908 gives the length of roads under construction by the state at 987 miles; privately constructed, 844 miles; proposed lines to be privately constructed, 681 miles.

The Belgian State Railroads ask for bids for supplying 802,000 tons of coal. In March they had let contracts for $3 per ton and 10 cents less than in the previous September. In May the Belgian mines offered nearly the prices as in June, but the English mines under bid them to such an extent that they were the lowest bidders for more than two-thirds of the whole.

General News Section.

According to a press despatch from Mobile, the Mobile & Ohio has restored to the former figures the salaries of those officers and employees, except tne President and Vice-President, whose pay was reduced on the first of March last.

The Illinois Central has put on full time the workmen in its shops at Burnside, Ill.; Waterloo, Ia.; Memphis, Tenn., and Water Valley and Vicksburg, Miss. According to the newspapers about 5,000 additional men will be put to work.

All trains running to and from the Grand Central Station, New York city, are now hauled by electric motors. The last steam locomotives (on a few of the trains of the New Haven road) were withdrawn June 27, four days within the time limit fixed by the special act of the legislature.

The San Antonio & Aransas Pass has asked the Texas State Railroad Commission whether it must conform to the provisions of the full crew law in the operation of motor cars in its passenger service. The law requires every passenger train to have an engineer, fireman, conductor and brakeman.

At Trenton, N. J., last Tuesday, about 16,000 persons gathered in Cadwalader Park to dedicate a bronze statue of John A. Roebling, founder of the wire industry in that city and builder of the Brooklyn Bridge. Of the persons present 6,500 were employees of the Roebling works, who marched through the streets of the city.

Vice-President Mohler, of the Union Pacific, announces that extension work on the company's lines will be at once resumed where it was stopped several months ago because of the threatening financial clouds. Work will begin on the Athol Hill cut-off, in Colorado, and the extension of the branch line up the North Platte river from North Platte to North Port.

The New York State Public Service Commission (first district) has engaged Bion J. Arnold, of Chicago, to supervise the appraisal of the properties of the surface street railway companies in Manhattan and the Bronx, New York city. This work will be begun at once and will be pressed to completion as rapidly as possible. The companies have been called on to furnish complete inventories by July 15.

Some of the railroads of eastern Texas suffered so much damage from the recent floods that the logging business along the lines was temporarily suspended. Steps have been taken to rebuild the lines high above probable future floods. On the Burr's Ferry, Browndel & Chester, which does a heavy lumber traffic, about two miles of track in the Neches river bottoms was under water for a few days, but owing to the substantial character of construction it suffered no washouts, even its bridges and small culverts coming out all right. The road is being extended and when finished will be about 80 miles long. It is estimated that the cost of repairs will be something like $1,000,000 for all of the roads.

Division No. 9 of the Order of Railroad Station Agents was organized at Albany, N. Y., on Friday, June 26. According to the reports published in the Albany papers, the membership is made up mostly of agents on the New York Central between Albany and Syracuse and of the Delaware & Hudson Company. Resolutions were passed recommending an organized system of "earnest, sensible, united and effective co-operation with our employers to the end of so influencing general public and legislative opinion, and more particularly that of the business community, that a just and equitable and reasonable advance in railroad freight rates may be effected. . . . Action of this character will materially hasten the early return of prosperity and plenty."

President Finley, of the Southern Railway, announces that "in view of the demonstrated greater efficiency of labor and its resulting benefits to the companies," and in the hope, and with some expectation, that present business conditions may show an improvement, an understanding has been reached, through Messrs. Knapp and Neill, with all classes of employees that were parties to the settlement of April 1, 1908, to the effect that negotiations now temporarily suspended shall be further postponed until October 1, next, at which time such negotiations may be resumed at the option of the companies.

The Interstate Commerce Commission has notified western railroads to be more careful in their obedience to the law forbidding free passes. Six classes of persons are named whom the commission declares are not among the exceptions laid down in the law, as follows: Officers or employees of news companies other than newsboys; officers or employees of telegraph or telephone companies, except when personally engaged in operation, extension, repair or inspection of lines in connection with the operation of the railroad; officers or employees of surety, transfer and baggage companies except baggage agents; officers or employees of carriers not subject to the act to regulate commerce (steamboat lines); officers or employees of subsidiary corporations, families of local attorneys, surgeons and others. The order says: "Many abuses in the issuance and use of passes have been discovered by the commision which it is desired to correct, and to this end, and because of the misinterpretation of the law by carriers generally, the commission at this time makes announcement that it will recommend the indictment and prosecution of all carriers and persons issuing passes to or allowing the use of passes by any persons not included within the designated classes to whom free transportation may be given by carriers." The carriers are enjoined against the destruction of records of memoranda touching the issuance of passes, and the passes themselves, coming into the hands of the carriers after use, must be retained for a period of not less than five years.

Three Cent Fares in Cleveland.

The people of Cleveland voted last fall to accept the three-cent fare offered them by Mayor Johnson in preference to the seven tickets for a quarter, with universal transfers, embodied in the proposal of the Cleveland Electric Railway Company for a 25-year extension of its franchises, but there has been an awakening. The rates of fare now charged are: For a single ride on a single line, 3 cents; for a single ride and one transfer to a second line, 4 cents; for single ride with two transfers (or to and from a cross-town line), 5 cents; for a single ride to any suburb, 5 cents; for a single ride to a suburb involving one transfer, 6 cents; for a single ride to any suburb involving two transfers, 7 cents. This condition of affairs is to continue until July 26, at least, when there is a promise that on that date 3 cents fare will be established within the city, with universal transfers.

For the first ten days of the operation of the lines by the Municipal Traction Company no transfers were given, and thousands of passengers were forced to pay two or three fares to go to their destination, and thousands of persons walked to and from transfer points to avoid paying these extra fares. As a result the number of transfers issued now averages 75,000 a day as against an average of double that number while the Cleveland Electric was operating the roads.

The old company carried passengers to all the suburbs and over its entire system for one rate of fare and the longest ride was 19 miles. Now it will cost 6 or 7 cents to get to most of them.

But the rates of fare are not the principal objections to the new order of things. Several lines which had been operated for years were abandoned. The only excuse was that these lines were not profitable. The Municipal Traction Company said their purpose was to make the lines profitable.

The part of the Wade Park avenue service abandoned ran through a thickly populated section. It was midway between two other lines, nearly half a mile apart. The effect of the abandonment was to congest traffic on these other two lines, but instead of increasing the service upon them the number of runs on each was reduced and cars were packed to the doors even early in the afternoon. Two or three mass meetings were held. To meet the complaint the company restored service on a part of the abandoned track, establishing a new

line, which began on a "Y" and ran to an out-of-the-way part of the downtown section, but nobody wanted to ride on it. . . . After a mass meeting had been held, the Union avenue service was restored. Members of the council who had voted for Johnson's traction measure denounced many of the changes in service as outrageous and demanded that old lines be restored.

Only one suburb had a contract with the old company which required the same rate of fare as was given in the city. That was East Cleveland. This rate of fare was demanded from the municipal concern. The concession was made after suit had been brought to enforce the contract, but they restricted the service on the line to the suburb to a car every ten minutes during the day. No cars were run after midnight. Interurban cars running through the village were forbidden to stop to take on city passengers, but this order was rescinded after a clash with the village police, who piled bricks across the tracks and stopped all interurbans at the village limits.

The same sort of trouble was experienced in Lakewood, the western suburb, and it was only after Mayor Miller had threatened to tear up the tracks and stop all interurbans that he finally forced terms of peace.

The trial of the 3-cent fare thus far has convinced people that the only ones benefited by the new system are those who make short rides to and from their homes and business and never ask for transfers. . . . Then came the strike—the revolt of the old Cleveland Electric employees against the refusal of Du Pont to recognize their contract. The strike is ended, so far as it affects the company, but there are other conditions to be faced. A petition bearing the names of nearly 30,000 voters has been filed asking for a referendum on the security grant given to the Cleveland Electric Railway Company, the 25-year six tickets for a quarter grant, under which the municipal company is operating. Johnson, though ardently an advocate of the initiative and referendum, appears not to want this grant to go to a vote of the people. He is questioning the validity of the petitions filed and has written personal leters to all the signers, asking if they signed in good faith, and if not, suggesting that they withdraw their names. —*New York Herald.*

Punished for Lending a Commutation Ticket.

Fines of $2,000 each have been imposed on two Memphis men by Judge Handley, of the United States District Court of Alabama. Thomas Williams, of Memphis, "commuted" to Birmingham. He lent his ticket to Daniel Pound, who presented it for passage. The conductor knew Williams, but allowed Pound to continue through to Birmingham. There a deputy marshal, summoned by telegraph, was on hand to arrest Pound, and a charge of violation of the interstate commerce law was lodged against him. In his ruling the trial judge held that the acceptance of free transportation was a high crime, and when Williams was tried and convicted the court decreed that he was guilty of aiding and abetting Pound in the commission of the same crime, and each man was fined $2,000. The court held that as the contract under which the ticket was sold provided that the ticket would become void if presented for passage by any one other than the person to whom it was issued, Pound had accepted free transportation.—*Exchange.*

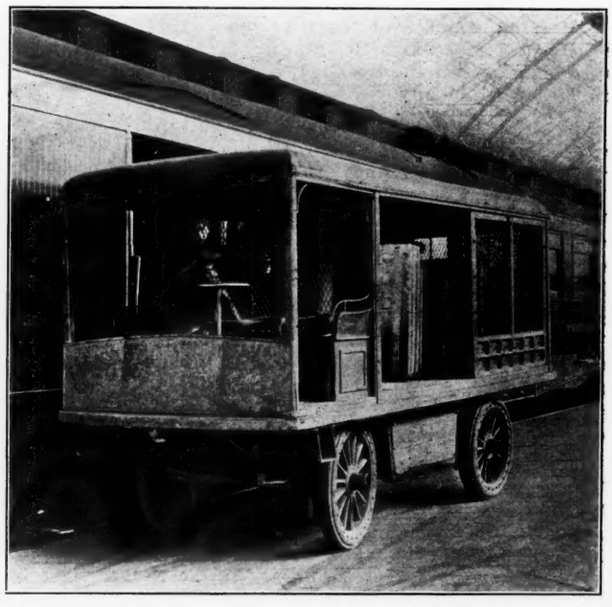
New York Central Rails.

At the April meeting of the American Railway Association, P. H. Dudley gave the following details of the manufacture of the rails ordered by the New York Central Lines for 1908 requirements:

Our new specifications require that the metal shall be recarburized in the converter in preference to the ladle, and held there two and one-half minutes before being poured into the ladle; and the nozzle to be used for teeming the ingots to be one and one-half inches, instead of two and two and one-half inches, and, in some instances, three inches. The ingots for 100-lb. rails to be only for three lengths, and the ingots for 80-lb. rails to be only for four lengths, which make the ingot about four thousand pounds in weight. The 100-lb. rail ingots formerly were for four lengths, and the 80-lb. rail ingots were for five lengths, and the ingots weighed about five thousand pounds. Several thousand tons have been rolled under these specifications. The seconds under the former specifications, when running well, would be 10 to 15 per cent., and sometimes they would rise to about 40 per cent. The seconds under the 1908 specifications for a single week have only been 3 per cent., and some days only 1½ to 2 per cent. The ingots bloom well without cracking, and few checks have been found either in the base or head of the rails. The metal is exceedingly tough. The principal precaution we have to take is to prevent some of the bars being over-chilled by cold rolling. We have investigated the fractures, and find nearly all the breaks in our rails are in those that have been rolled so cold and can be traced back to the gag mark by the type of fractures; therefore, we avoid the so-called "cold rolling."

Electric Baggage Trucks.

The Pennsylvania Railroad, as an experiment, has introduced the use of automobiles to expedite the handling of freight between stations in large cities. Such a service has been started between Kensington and Shackamaxon stations in Philadelphia, and if that is a success, it is planned to try the same experiment in other large terminal cities, such as Pittsburgh and Baltimore. The automobile truck which the Pennsylvania is using in Philadelphia has saved between six and twelve hours in the handling of package freight between the stations named. This freight automobile has a capacity of five tons and is driven by a six horse-power electric motor. It averages about seven and one-half trips a day, carrying 2.2 tons per trip; its daily mileage averaging about eight miles. Before the introduction of the automobile in the Kensington district, small lots of freight were sent from station to station in cars. With the automobile service, congestions are relieved, and the movement of freight by a direct route instead of a circuitous one saves both time in delivery and the use of freight cars.



Automobile Baggage Truck; Pennsylvania Railroad.

The Pennsylvania is also using automobiles in its passenger service. In Jersey City an innovation is the introduction of large automobile trucks in the baggage service. These trucks, one of which is shown in the accompanying photograph, are about the size of a three-horse wagon and are so built that when being loaded the floor of a truck is on a level with and flush against that of a baggage car. Many hard knocks are saved to every trunk handled in this way through the Jersey City station. In moving a trunk from the car to the truck, it gets about the same handling it would get in being shifted about inside the same car. This is but one of the trunk-protective features of the trucks. Another is that they are en-

closed entirely with a wire grating and leather top, preventing any scraping or falling in the trip across the river. The service to which the new trucks are being put entails through trips between the baggage cars in Jersey City and the Twenty-third street station, New York. They are loaded to their full capacity and are raised and lowered to and from the ferry level on elevators. The electric power does away with the manual labor formerly necessary to push loaded trucks up the heavy grades at the approach to the ferries at certain stages of the tide. The truck is about fifteen feet long and five feet wide, with a seat in front for the driver. Its height, about nine feet, is necessary, in order that the floor of the truck may meet the baggage car floor on a level.

Not only in Jersey City is the automobile being used in the passenger service. In Broad street station, Philadelphia, there are in use automobile trucks for baggage and mail. These, however, as described in the *Railroad Gazette*, June 14, 1907, are about the size of an ordinary hand truck, and very similar in appearance. The electric mechanism is placed under the body of the truck, and is operated from the handle or "tongue." So satisfactory have these automobiles proved in the baggage and mail service, that there are now being built a number of small electric trucks for use in the new terminal station in Washington. These will be similar to the trucks now used in Broad street station, though they will embody improvements which are expected to overcome the slight difficulties which have been experienced with the first automobile trucks that were placed in service.

Steamer Commonwealth.

The new steamer "Commonwealth," of the Fall River Line, exceeds in size, speed and magnificence any vessel heretofore built for service on inland waters. She cost $2,000,000, and is the largest and costliest steamer in American waters. With a commanding high bow and true sheer, curving gracefully two-thirds of her length, the "Commonwealth's" broadside is a beautiful model. Her length over all is 456 ft.; breadth of hull, molded, 55 ft.; breadth over guards, 96 ft.; depth of hull, 22 ft. She has sleeping accommodations for 2,000 persons. Long experience having proved that the side-wheel steamer is best adapted to the particular circumstances of the Fall River Line, the "Commonwealth" is of this type. The broad beam of the side-wheel steamer insures steadiness in a seaway and the ability to deaden headway quickly. Another advantage is the total lack of vibration, a feature which enables passengers to enjoy as restful sleep at night as though they were on land. The architectural adornment of the "Commonwealth" embraces several periods. The style of the quarter-deck is modern English, the woodwork being oak. Surmounting the oaken columns are grotesquely carved mariners' heads, forming a corbel. At one end of the lobby is a beautiful painting on maple. The social hall and library is a saloon of the period of Louis XVI. The bookcases, tables and chairs are of mahogany. On the saloon deck is a beautifully decorated saloon of the period of Louis XV. The ceiling is paneled with papier mache. The color scheme is creamy white embellished with gold. Carpets and upholstery are of green and the furniture is in harmony with the decorative period. Opening off this saloon are eight parlor suites of the Louis XVI. and Louis XV. periods, the decorations and furnishings of which are in keeping with the magnificence of the saloons. The beds in these suites are gold plated. The grand saloon extends up through two decks and is the main assembly room of the steamer. This splendid room is a beautiful example of Venetian Gothic style. The second or gallery deck of the steamer forms a balcony around this saloon. Forward on the gallery deck are the writing room and the newsstand. The decoration of this apartment is in French gray. The writing desks have glass tops and softly shaded reading lamps. The writing paper bears the "Commonwealth's" crest, which is the combined coats of arms of the States of New York, Connecticut, Rhode Island and Massachusetts worked into a shield. Here are the telephone central exchange and the station of the wireless telegraph service with which all steamers of the Fall River Line are equipped. Every stateroom has a telephone, enabling the passenger to speak with the purser or steward or with a friend occupying another stateroom.

On the dome deck, 50 ft. above the water, are the dining room, men's cafe and the kitchens. The windows of this room afford a superb outlook. The kitchens are finished in white enamel and equipped with electric broilers, automatic egg boilers and electrically operated dishwashing machines. This compartment is completely sheathed in iron.

Like all steamers of the Fall River Line, the "Commonwealth" is built of steel. Seven bulkheads extend to the main deck and they contain no doors to be left open by carelessness. She has a double hull and the space between the bottoms is divided into many water-tight compartments. There are also collision bulkheads at each side of the steamer at the guards and a bulkhead athwartship. The steamer will carry a life-saving crew and will have one-third more life preservers, life rafts and buoys than are required by the United States Government regulations.

The "Commonwealth" will have a speed of 22 miles an hour. Her engine is of the double inclined compound type, with two high-pressure cylinders 96 in. in diameter, all having a common stroke of piston of 9 ft. 6 in. The hign-pressure cylinders have adjustable cut-offs and the low-pressure cylinders fixed cut-offs.

There are two air pumps driven from the low-pressure crossheads. The wheels are of the feathering type, with curved steel buckets. Besides the usual auxiliary steam pumps there is a large pump for use only on the fire sprinkler system. This system consists of 1,800 Grinnell heads, arranged to cover the interior of the steamer in the most thorough manner. Thermostats and a watchman's clock system augment the sprinkler system as safeguards against fire. Three dynamos furnish current for 3,000 electric lights and a powerful searchlight, as well as power for an electric elevator to the kitchen, and blowers for ventilating the cabins.

The "Commonwealth" was designed by J. Howland Gardner, Superintendent of Marine Construction of the New England Navigation Company, the owner of the vessel, and built by the Quintard Iron Works, New York, and the William Cramp & Sons Ship & Engine Building Co., Philadelphia, Pa. The cabinet work, decorations and furnishings were conceived and executed by the Pottier & Stymus Co., New York.

Reclaiming the Desert Along the Chicago, Rock Island & Pacific.

B. F. Yoakum, in speaking of the work done in the gulf coast country in southern Texas to reclaim the desert, says that the lands there are fully as rich as those of the Nile. He says: "The first cost of machinery and canals ranges between $20 and $30 an acre, and, of course, is added to the price of the land, which could be bought before the railroad ran through southern Texas at $3 an acre. After the water is in, the annual charge will depend on the crops, but will probably not be more than $5 an acre. It costs about $7 an acre to clear the land of cacti and brush. With water, two crops of corn or nine cuttings of alfalfa can be harvested in a year. Bermuda onions have actually yielded a net profit of $350 an acre. We hope to make this part of southern Texas a vast grove of orange, lemon, date and fig trees. White pecans and English walnuts grow well. In time a modern sugar mill and refinery is to be built. Cane will be loaded on cars in the fields and hauled to the mill by electric motors."

Hudson River Tunnel Supports.

The problem of supporting the tunnels under the North river in New York City at the time the designs for these tunnels were first made attracted a great deal of attention, and in the Pennsylvania tunnels provision was actually made whereby supports or foundations could be installed at any time hereafter. It has been found, however, that supports of any kind are not required, and numerous and expensive tests and investigations were made during the period of construction and after the tunnels were joined by the Hudson Companies and by the Pennsylvania Railroad to establish this fact. The Pennsylvania North river tunnels were joined in 1906, and the Hoboken tunnels of the Hudson Companies have been in operation for some five months, and it has been demonstrated by practical experience that no

necessity exists for supports. The records made by the engineers, both before and after the completion of the Hudson Companies' tunnels, show that they are as permanent and substantial as any tunnels under the East river, and with the actual running of trains under a very frequent service no vibration has been noticed nor is expected. The tunnels of both companies have concrete benches inside, which add to the stiffness of the structure, and we understand that the contractor is now lining the Pennsylvania tunnels with concrete. This lining is about 2 ft. thick, and when added to the heavy iron tube makes a structure that will stand the greatest shock or strain that can possibly occur, without damage, and enables the tunnels to be maintained and operated at the minimum of expense.

Traffic News.

The extra charge for lighterage in New York harbor on split car lots for export is to be reduced by the Trunk Lines to $1 for each extra delivery, beginning August 1.

W. C. Brown, Senior Vice-President of the New York Central incidentally, in an interview on the business situation, said this week that "the general increase in freight rates" would become effective October 1.

At San Francisco, June 26, the Federal Grand Jury returned an indictment against the Southern Pacific, charging the company with giving rebates on shipments from Nevada; and a similar indictment containing the same number of counts was returned against the Pine Box & Lumber Company for accepting rebates.

The embargo which was put on through freight by the Northern Pacific early in June on account of the floods in Montana, which destroyed a part of the company's road, was lifted June 24. An interruption of about the same length of time came to an end about the same time on the lines of the Santa Fe road in Oklahoma.

In the Federal court at Chicago last Tuesday A. Booth & Co. pleaded guilty to having accepted rebates from the Lehigh Valley and the New York, Chicago & St. Louis. Booth & Co., using their own refrigerator cars, organized the Overland Refrigerator Express Company, and were paid a rebate of 12½ per cent. (on the freight rate) on their own shipments.

The Iowa State Board of Railroad Commissioners has issued a revised freight classification, taking effect July 1, which makes some reductions in rates. Where the classification is lower in the western classification than in the former Iowa classification the lower one has been adopted. Where the Iowa rates originally were lower than the western they remain the same.

The Texas State Railroad Commission has issued notice that it will on August 11 give a public hearing on a proposition to reduce the freight rates 25 per cent. on carload shipments of iron pipe, boiler tubes, connections, fittings and other iron articles in order to meet the low interstate rates now in effect from St. Louis to Texas points which are alleged to operate to the disadvantage of the jobbers of Texas.

Eastbound shipments from Chicago for the week ending June 27 indicate some improvement. The aggregate was 76,481 barrels of flour, 3,340,574 bushels of grain and 24,059 tons of provisions. Compared with the preceding week, this was an increase of 9,275 barrels of flour, 308,729 bushels of grain and 1,111 tons of provisions. The comparison with the same period last year shows a decrease of 38,289 barrels of flour, but grain increased 1,500,860 bushels and provisions 1,283 tons.

On July 1, the day when the railroads, according to the announcement made a few weeks ago, began to insist rigidly on having all packages of freight fully marked, agents were also instructed to increase the percentage which is added to the freight rate when goods are not suitably packed in strong boxes. One of the rules stipulates that "property packed in boxes or cases made from strawboard, leatherboard, woodpulp, fiber, wired splintwood or other analogous material, will be charged 10 per cent. higher than the classification provided for such property." The 10 per cent. is to be increased to 20 per cent.

On Saturday last the Interstate Commerce Commission issued an order declaring unlawful the Kanawha Despatch joint eastbound freight tariff issued June 1 and effective July 1 under powers of attorney for the Chesapeake & Ohio and the Louisville, Henderson & St. Louis. The order was issued because of numerous and important departures from the requirements governing the construction of tariffs adopted by the commission. The commission has announced that it will prosecute any cases of use of such a tariff. This is the first time the commission has ordered a road to reissue tariffs.

The Chamber of Commerce of Milwaukee has filed with the Interstate Commerce Commission two complaints concerning rates on grain from points west of there, the tariffs, it is claimed, being cheaper to Chicago than to Milwaukee. The complaint is directed against the Chicago, Rock Island & Pacific, the Chicago, Milwaukee & St. Paul, the Illinois Central and the Chicago & North Western. It is declared that the roads make the lower rates to Chicago from points in Iowa, Minnesota and other states, notwithstanding that Milwaukee is, in the majority of cases, as near to the shipping point as is Chicago and in some is nearer. The brewery industry and other enterprises of like nature in Milwaukee afford a basis, it is claimed, for the development of a much larger grain manufacturing and shipping business than now exists. It is also charged that in the case of a small local road favorable rates of the kind now desired were actually accorded to Milwaukee shipments from all points in former times, but as soon as the small road passed under the control of the Rock Island the plan followed by the other through routes was at once introduced and now prevails.

At St. Paul last Tuesday Judges Sanborn, Hook and Adams, in the United States Circuit Court, made an interlocutory decree whereby they temporarily suspend the enforcement of the order of the Interstate Commerce Commission, which reduced the charge for the transfer of livestock in Chicago to the Union Stockyards from $2 to $1 a car. Judge Adams delivered the opinion of the court. The court held that the charge of $2 a car was reasonable, and that a reduction of it to $1 a car made it unreasonably low. The Interstate Commerce Commission made this charge unreasonably low because the rates of the railroad companies on their own roads and their through rates, composed of the rates on their own roads and the terminal charge of $2, were, in their opinion, unreasonably high. This was an error of law. The question of the reasonableness of each segregated rate must be determined by itself. The action was brought in the United States Circuit Court at St. Paul by Receivers Stickney and Smith, of the Chicago Great Western. The Chicago, Milwaukee & St. Paul, Chicago & Alton, Rock Island, and Atchison, Topeka & Santa Fe were parties to the suit.

Judges Grosscup, Baker and Kohlsaat, in the United States Circuit Court at Chicago, June 29, held that the Interstate Commerce Commission had exceeded its powers in making its order in the so-called Illinois Collieries case, and issued an injunction restraining the commission from enforcing a part of this order. The case decided was referred to in the issues of the *Railroad Age Gazette* of June 5, page 38, and of June 19, page 193. Three distinct questions were involved, relating, respectively, to the distribution of company cars, of private cars and of foreign railroad cars among coal mines. The court held that the Interstate Commerce Commission had power to apportion private cars and foreign railroad cars among the coal mines, but that it could not count a railroad company's own cars, used in the transportation of coal for its own use, against the mines from which the coal was secured. It held that the transportation of coal for the railroad's own use is not "commerce" within the meaning of the act to regulate commerce, and is, therefore, not within the jurisdiction of the commission. This is the first time that the questions involved have been decided by a Federal court since the revision of the law in 1906.

REPORT OF REVENUES AND EXPENSES OF RAILROADS.

MONTH OF APRIL, 1908.

(See also issues of June 26, June 19, June 12, June 5.)

Name of road.	Mileage operated at end of period.	Operating revenues: Revenue, Freight.	Revenue, Passenger.	All other revenue from transportation.	Revenue, operations other than transportation.	Total operat'g revenues.	Operating expenses: Maintenance, Way and structures.	Maintenance, Of equipment.	Expenses, Traffic.	Expenses, Transportation.	Expenses, General.	Total operating expenses.	Net operating revenues (or deficit).	Taxes.	Operating income (or loss).
Alabama & Vicksburg Ry	143	$71,624	$29,657	$7,739	$836	$109,856	$21,867	$23,558	$3,374	$46,505	$4,496	$99,740	$10,116	$3,600	$6,516
Central Branch Ry	388	78,900	20,959	7,925	757	108,541	9,027	9,029	2,603	34,179	3,398	58,236	50,305	10,000	40,305
Grand Trunk Western Ry.	336	301,447	116,785	19,555	327	438,114	29,344	56,030	20,510	181,776	9,235	296,895	141,219	32,669	108,550
Indianapolis Southern	179	46,756	19,460	2,717	231	69,164	24,790	$10,851	1,046	30,680	1,365	47,030	22,134	2,208	19,926
International Ry. of Maine.	233	77,623	41,020	7,445	1,337	127,425	15,826	19,750	2,578	51,215	1,999	91,368	36,057	3,750	32,307
Missouri Pacific	3,492	1,057,121	288,135	123,401	22,086	1,490,743	164,830	129,309	39,807	620,696	50,731	1,005,373	485,370	78,390	406,980
Richmond, Fredericksburg & Potomac	83	124,190	55,556	18,574	539	198,869	28,719	28,366	2,495	59,165	4,005	122,750	76,119	200	75,919
Rio Grande Southern	180	30,244	9,146	2,804	152	42,346	8,884	3,342	91	12,267	1,341	25,925	16,421	2,100	14,321
St. Louis, Iron Mountain & Southern	2,599	1,040,598	293,027	124,893	22,172	1,480,690	231,044	133,830	40,194	565,059	44,996	1,015,123	465,567	62,127	403,440
Vicksburg, Shreveport & Pacific	171	58,180	30,910	6,628	1,268	96,986	25,175	20,982	3,193	35,492	4,630	89,472	7,514	5,800	1,714
Western Maryland	543	365,409	53,014	18,327	4,126	440,876	43,368	60,517	5,864	143,428	11,028	264,205	176,671	16,500	160,171
TEN MONTHS OF FISCAL YEAR, 1908.															
Alabama & Vicksburg Ry	143	$811,639	$387,951	$80,778	$12,663	$1,293,031	$221,782	$225,306	$31,216	$479,425	$45,029	$1,002,758	$290,273	$33,405	$256,868
Central Branch Ry	388	928,003	270,794	80,985	9,014	1,288,796	227,527	173,370	28,428	376,702	37,369	843,396	445,400	100,000	345,400
Grand Trunk Western Ry.	336	3,377,621	1,512,936	174,321	5,195	5,070,073	721,225	1,002,860	183,945	1,938,445	96,266	3,942,741	1,127,332	326,693	800,639
Indianapolis Southern	179	496,009	189,358	31,126	5,105	721,598	209,503	118,007	11,722	332,556	14,012	685,800	35,798	22,083	13,715
International Ry. of Maine.	233	599,659	215,394	59,781	7,455	882,289	178,791	154,305	22,837	395,695	23,315	774,943	107,346	37,500	69,846
Missouri Pacific	3,492	12,748,131	3,496,998	1,324,059	345,826	17,915,014	2,773,763	2,462,336	468,955	7,497,448	555,764	13,758,266	4,156,748	746,700	3,410,048
Richmond, Fredericksburg & Potomac	83	839,573	610,861	160,488	12,145	1,623,067	258,559	282,524	25,532	581,449	48,673	1,196,738	426,329	2,000	424,329
Rio Grande Southern	180	373,648	102,559	30,250	846	507,303	118,478	36,488	1,071	152,214	14,883	323,134	184,169	24,300	159,869
St. Louis, Iron Mountain & Southern	2,599	13,339,272	3,726,543	1,302,714	326,349	18,694,878	2,740,459	2,412,061	434,744	6,892,798	567,105	13,047,167	5,647,711	542,957	5,104,754
Vicksburg, Shreveport & Pacific	171	718,850	420,330	80,695	15,607	1,235,482	272,624	231,697	31,427	434,852	39,945	1,010,545	224,937	58,350	166,587
Western Maryland	543	3,904,760	685,303	184,547	28,977	4,803,587	549,001	755,865	68,166	1,558,378	118,940	3,050,350	1,753,237	155,350	1,597,887
SUMMARY.															
762 January reports filed	226,025	118,433,592	40,282,451	12,896,795	2,157,035	173,769,873	21,167,511	29,725,028	3,951,485	72,689,137	4,817,076	132,913,336[1]	40,856,537	6,748,911	34,107,626
Per mile	...	523.98	178.22	57.06	9.54	768.80	93.65	131.51	17.48	321.59	21.32	588.04	180.76	29.86	150.90
Ratio, per cent.	...	68.16	23.18	7.42	1.24	100.00	12.18	17.11	2.27	41.83	2.77	76.48	23.52	3.89	19.63
752 February reports filed	226,287	110,780,864	36,073,619	12,476,469	1,791,183	161,122,135	18,993,162	27,462,494	3,806,710	68,871,361	4,580,001	124,267,186[2]	36,854,949	6,810,710	30,044,239
Per mile	...	489.56	159.41	55.13	7.92	712.02	83.93	121.36	16.82	304.35	20.25	549.15	162.87	30.09	132.78
Ratio, per cent.	...	68.75	22.39	7.75	1.11	100.00	11.78	17.05	2.37	42.75	2.84	77.13	22.87	4.22	18.65
756 March reports filed	226,163	128,285,611	40,176,204	13,434,508	1,832,217	183,728,540	20,860,055	28,177,473	3,821,746	70,868,433	4,687,649	128,928,522[3]	54,800,018	6,857,611	47,942,407
Per mile	...	567.23	177.64	59.40	8.10	812.37	92.23	124.59	16.90	313.35	20.73	570.07	242.30	30.32	211.98
Ratio, per cent.	...	69.82	21.87	7.31	1.00	100.00	11.35	15.34	2.08	38.57	2.55	70.17	29.83	3.73	26.10
742 April reports filed	226,475	119,046,753	40,974,051	13,325,581	1,611,317	174,966,362[5]	24,168,138	26,100,548	3,832,946	65,725,948	4,517,460	124,862,189[4]	50,104,173	7,061,611	43,042,562
Per mile	...	525.65	180.92	58.84	7.11	772.56	106.71	115.25	16.92	290.22	19.95	551.33	221.23	31.18	190.05
Ratio, per cent.	...	68.04	23.42	7.62	.92	100.00	13.81	14.91	2.19	37.56	2.58	71.36	28.64	4.04	24.60

Not distributed: [1] $563,099; [2] $553,458; [3] $513,166; [4] $517,149; [5] $8,660.

MONTH OF MAY, 1908.

Alabama & Vicksburg Ry	143	$63,609	$37,328	$9,081	$1,182	$111,200	$16,070	$28,388	$3,015	$44,340	$4,528	$96,349	$14,851	$3,600	$11,251
Bessemer & Lake Erie	201	164,112	19,907	5,747	189	189,955	46,467	57,030	4,809	79,697	5,573	193,576	3,621*	4,000	‡7,621
Chicago & North-Western Ry	7,630	2,857,223	1,160,138	403,524	38,251	4,459,136	781,623	304,852	68,928	1,729,838	85,427	2,970,668	1,488,468	222,000	1,266,468
Chicago, Peoria & St. Louis Ry	255	71,395	24,238	5,232	455	101,320	19,661	24,482	6,002	50,371	4,492	105,008	3,688*	4,500	‡8,188
Chic., St. Paul, Minneapolis & Omaha.	1,730	572,557	258,149	62,730	7,502	900,938	122,614	83,974	17,196	368,755	23,731	616,270	284,668	52,969	231,699
Chicago Terminal Transfer R. R. Co.	90	8,250	2,469	59,127	54,393	124,239	16,212	26,305	663	37,542	4,666	85,388	38,851	14,482	24,369
Cumberland Valley	162	137,396	42,689	8,340	1,709	190,134	30,617	20,970	3,940	60,293	4,525	120,345	69,789	3,797	65,992
Delaware & Hudson Co.	845	1,230,541	185,919	35,140	12,684	1,464,284	161,421	195,466	14,737	545,525	30,309	947,458	516,826	35,000	481,826
Duluth & Iron Range	168	134,741	18,189	4,042	3,356	160,328	59,365	45,192	247	49,100	5,473	159,377	951	8,204	‡7,253
Georgia Southern & Florida	395	70,329	44,005	20,146	733	135,213	11,103	29,004	5,235	63,389	7,247	115,978	19,235	7,387	11,848
Kansas City Southern	827	432,186	94,582	53,523	9,519	589,810	71,982	59,603	22,212	217,971	21,924	393,692	196,118	29,564	166,554
Lehigh Valley	1,452	2,590,486	297,381	73,242	21,058	2,982,167	267,184	360,029	62,064	892,317	41,916	1,623,510	1,358,657	94,300	1,264,357
Maine Central	931	386,595	206,491	40,554	4,182	637,822	154,943	107,178	5,876	231,397	15,348	514,743	123,079	31,622	91,457
New Orleans & Northeastern	196	145,830	37,134	14,829	3,069	200,862	25,467	45,856	7,193	70,358	8,399	157,273	43,589	6,500	37,089
Norfolk & Southern	582	135,580	49,969	9,095	1,621	196,265	20,595	31,878	5,151	78,148	11,517	147,289	48,976	7,700	41,276
Terminal R.R. Ass'n of St. Louis	26	.....	173	157,498	2,001	159,672	14,966	17,077	361	53,366	5,542	91,312	68,360	23,300	45,060
Vicksburg, Shreveport & Pacific	171	45,135	35,041	6,833	1,060	88,069	27,317	18,668	3,135	35,877	3,834	88,831	762*	5,800	‡6,562
ELEVEN MONTHS OF FISCAL YEAR, 1908.															
Alabama & Vicksburg Ry	143	$875,248	$425,278	$89,859	$13,846	$1,404,231	$237,852	$253,693	$34,231	$523,773	$49,557	$1,099,106	$305,125	$37,006	$268,119
Bessemer & Lake Erie	201	4,520,136	270,435	67,511	12,322	4,870,404	528,810	923,161	49,000	1,427,451	65,397	2,993,819	1,876,585	38,000	1,838,585
Chicago & North-Western Ry	7,630	38,987,480	14,334,239	4,692,936	395,170	58,409,825	7,313,761	6,476,720	1,004,892	22,976,514	985,906	38,757,793	19,652,032	2,362,000	17,290,032
Chicago, Peoria & St. Louis Ry	255	1,022,905	275,813	62,172	10,789	1,371,679	218,950	328,037	62,670	582,828	47,296	1,239,781	131,898	45,500	86,398
Chic., St. Paul, Minneapolis & Omaha.	1,730	7,738,340	3,382,540	753,934	58,604	11,933,418	1,518,027	1,417,551	215,245	4,535,856	253,833	7,940,513	3,992,905	577,775	3,415,130
Chicago Terminal Transfer R. R. Co.	90	93,733	28,575	799,266	601,822	1,523,396	175,798	307,442	8,963	500,926	52,087	1,045,216	478,180	155,195	322,985
Cumberland Valley	162	1,786,739	544,636	96,157	23,468	2,451,000	306,491	273,582	39,700	759,994	54,536	1,434,303	1,016,697	41,773	974,924
Delaware & Hudson Co.	845	14,921,596	2,687,146	383,159	156,417	18,148,318	1,497,107	2,166,789	188,534	6,393,538	337,149	10,583,117	7,565,201	403,837	7,161,364
Duluth & Iron Range	168	5,319,947	247,570	31,691	48,550	5,647,758	651,682	585,657	3,080	1,141,801	68,339	2,450,559	3,197,199	228,761	2,968,438
Georgia Southern & Florida	395	1,004,763	611,913	199,282	9,992	1,825,950	216,088	353,929	57,631	761,598	92,174	1,481,420	344,530	85,244	259,286
Kansas City Southern	827	6,247,849	1,198,222	607,275	100,148	8,153,494	858,646	1,122,260	245,528	2,875,230	249,574	5,351,238	2,802,256	253,574	2,548,682*
Lehigh Valley	1,452	27,579,768	3,791,969	810,911	260,887	32,443,535	3,358,627	5,595,572	719,803	10,511,357	524,649	20,710,008	11,733,527	1,037,300	10,696,227
Maine Central	931	4,711,082	2,603,146	449,062	62,925	7,826,216	1,104,689	1,149,875	61,607	2,928,794	178,628	5,423,593	2,402,623	342,904	2,059,719
New Orleans & Northeastern	196	1,928,536	555,155	127,269	46,844	2,657,804	344,242	517,731	79,086	944,158	90,154	1,975,371	682,433	68,831	613,602
Norfolk & Southern	582	1,306,359	616,446	95,914	18,925	2,037,644	281,983	334,906	71,780	814,612	123,462	1,626,743	410,901	72,700	338,201
Terminal R.R. Ass'n of St. Louis	26	.....	2,418	2,024,428	30,936	2,057,782	193,390	158,960	4,688	717,078	53,430	1,127,546	930,236	243,932	686,304
Vicksburg, Shreveport & Pacific	171	763,984	455,371	87,528	16,668	1,323,551	299,942	250,366	34,562	470,729	43,778	1,099,377	224,174	64,150	160,024

* Deficit. ‡ Loss. § Credit.

STATE COMMISSIONS.

Nebraska. Transfer Switch Ordered.

New York Commercial Club v. Chicago & North-Western and Chicago, Burlington & Quincy. Opinion by Commissioner J. A. Williams.

York is a city of more than 5,000 inhabitants and is 117 miles from Lincoln and 155 miles from Omaha via the Chicago & North-Western. It is 52 miles from Lincoln and 107 miles from Omaha via the Chicago, Burlington & Quincy. The Burlington extends east and west through the town and north and south, terminating on the north at Stromberg, 17 miles distant, where it meets the Union Pacific. There is a transfer switch between the two lines of the Burlington. The Chicago & North-Western runs through the town in a northeasterly direction. There is no transfer switch between the Burlington and the Chicago & North-Western in York. One business concern on the C. & N.-W. transfers in wagons to and from the Burlington 100 carloads of flour and coal a year at a cost of from $5 to $10 per carload. There is a brick yard on the Burlington whose output is from six to seven million bricks per year, being about 700 carloads. In order to ship to points on the North-Western it is necessary to haul these bricks about a mile in wagons. It is specifically provided that the commission shall have power to establish joint rates, and it follows that with the power to "regulate service" the commission shall have full power to order such facilities as may be required to put in effect joint rates which it may establish. The Chicago, Burlington & Quincy and the Chicago & North-Western are ordered therefore to jointly build a transfer switch.

Indiana. Joint Coal Rate Re-established.

The Queen Coal & Mining Company v. Southern Indiana and Chicago & Eastern Illinois. Opinion by Commissioner Dowling.

The petitioner's mine is at Jasonville, Greene county, in the Linton coal district. The company desires to obtain a market for its product in the towns of Attica and Brook, and all points south thereof, located on the Chicago & Eastern Illinois. Prior to April 1, 1908, the Southern Indiana and the Chicago & Eastern Illinois had a joint rate on bituminous coal from Jasonville of 70 cents to Attica and 80 cents to Brook. On the date aforesaid, these rates were canceled at the instance of the Chicago & Eastern Illinois, and there was substituted a combination of locals which aggregated 90 cents to Attica and $1 to Brook. At these rates it will be impossible for the petitioner to market its coal at any of the points above mentioned. If the former rates are re-established, the petitioner will probably be able to sell 10,000 or 15,000 tons a year in the Attica and Brook territory.

The Chicago & Eastern Illinois claims that there no longer exists any necessity for a joint rate on coal from the Linton district with the Southern Indiana, since the latter's line now extends the entire distance to Chicago; and also that the coal shipped from the petitioner's mine into the Attica and Brook territory displaces coal whose shipment originates at points upon the line of the Chicago & Eastern Illinois in Indiana.

As to the first ground of objection, the Commission is of the opinion that while the occasion for a joint rate has ceased, so far as the needs of the Southern Indiana are concerned, the petitioner still requires such joint rate to market its product. Presumably, also, it will be to the advantage of Attica, Brook and neighboring points to secure another competitor in the coal trade.

Regarding the second ground of objection, the Commission concludes that it will be only fair to the petitioner to permit it to come into competition with coal operators located at about the same distance from Attica and Brook as is the petitioner, and whose mines are along the line of the Evansville and Terre Haute in Sullivan county. (Cardiff Coal Co. v. C., M. & St. P. Ry. Co., I. C. C., decided April 6, 1908.) The latter are now charged 70 cents to Attica upon a haul of 113 miles and 80 cents to Brook upon a haul of 156 miles. From points in the Linton district to Attica via the Southern Indiana the distance is approximately 112 miles, and from such initial points to Brook it is 165 miles. It will be seen, therefore, that the distance over which the petitioner's coal is carried is nearly the same as that over which its competitors' product is transferred. To permit the Chicago & Eastern Illinois to give an advantage of 20 cents per ton to shippers located along the Evansville & Terre Haute, which is a line affiliated with the C. & E. I., would result in a monopoly of the trade by these shippers, so far as the petitioner is concerned. The joint rates on coal in force immediately prior to April 1, 1908, over the Southern Indiana and the Chicago & Eastern Illinois, from Jasonville to Attica and Brook, and to points south of these towns upon the line of the C. & E. I., should be re-established, and it is accordingly so ordered.

San Francisco Holiday Traffic.

With the progress of the voyage of the Atlantic fleet from Hampton Roads to the Pacific there was a constant increasing interest all along the Pacific coast, and when it became likely that Admiral Evans would be able to again take the bridge of his flagship and lead the world-renowned fleet through Golden Gate into San Francisco bay, it became apparent that the largest crowd that San Francisco had ever witnessed would be there to greet the fleet as it steamed into the harbor.

With this prospect in view it was necessary that the railroads make unusual arrangements, and the Southern Pacific Company at once took action. This company operates three main lines which terminate on the Oakland side of San Francisco bay, and also the Coast Line from Los Angeles into San Francisco. It also runs two lines of passenger ferry steamers from the Oakland and Alameda piers to the foot of Market street, San Francisco. The distance across San Francisco bay between the points named is four miles. On the Oakland-San Francisco ferry there are three boats running at a 20-minute interval, and on the Alameda-San Francisco ferry two, with a 30-minute interval. To better handle the crowds during the time the fleet was in the bay a third steamer was placed on the Alameda ferry, and boats on that run were also operated on a 20-minute time-table. By alternating the leaving time from the foot of Market street, San Francisco, 10-minute service was furnished from San Francisco to Oakland and Alameda. These boats are each capable of carrying about 4,000 people.

Out of Oakland pier there are operated three sets of suburban trains to connect with each boat. Out of Alameda pier three sets of trains are also operated; two for different lines in Alameda and Oakland and one to swing horse-shoe fashion from Alameda pier to Oakland pier and vice versa.

A careful canvass of the country had been made with a view of ascertaining as nearly as possible the number of passengers that it would be necessary to handle. Extra cars were distributed to the various sections of the country and some extra cars put on regular trains moving toward San Francisco, commencing from the far distant points as early as the 3d of May, the fleet being due to arrive in San Francisco on the 6th. Arrangements were also made to run extra trains from the cities in the San Joaquin and Sacramento valleys and intermediate points wherever the regular train service would not be sufficient. One hundred and twenty-five extra coaches were thus distributed to various points. As the Overland colonist movement was just closing at that time the Pullman Company had a number of tourist cars on the coast and 60 of these cars were also pressed into service. Many of these cars made daily trips between San Francisco and points within a radius of 100 miles.

Westbound toward San Francisco there are scheduled on the different Southern Pacific main lines centering there and Oakland 56 passenger trains daily. During the fleet festival 61 extra passenger trains were run.

It could properly be said that the fleet festival extended over the period from May 4 to 17, inclusive. In these 15 days 1,541,616 passengers were handled, of which 358,220 were main line passengers and 1,191,396 suburban and ferry, an average of 103,308 per day.

During this period, the average number of trains per day in and out of the Oakland and Alameda moles was 558. On May 6, the day of densest traffic, 44,035 passengers from main line trains were handled, and 134,720 from suburban trains, a total of 178,755; and on this day 483 trains were run in and out of Oakland Mole, and 286 in and out of Alameda Mole, a total of 769 trains.

The fleet was timed to enter Golden Gate at 12 o'clock noon of the 6th, pass Goat Island at 1 o'clock and drop anchor at 2 o'clock. Judging from the punctual schedule that had been maintained by the fleet at all points before reaching San Francisco it was reasonable to suppose that this schedule would be carried out. For this reason it was necessary that the fairway be cleared and all transbay traffic stopped shortly after 12 o'clock; and the port officers so ordered. For this reason it was also necessary to arrange to get passengers from the outside points into San Francisco where they could have opportunity and time to get on the hillsides or other points of vantage from which to view the fleet before its arrival at Golden Gate. The last main line train was delivered at Oakland pier at 11 a.m., and suburban and ferry service was stopped at 12.08 p.m. The fleet passed Golden Gate on time and the last anchor was dropped within five minutes of the time that had been scheduled several weeks previous. Ferry service was resumed at 1.40 p.m. Four of the six ferry boats were on the San Francisco side and left promptly on their schedules, 10 minutes apart, for their respective piers. With the 10-minute headway it was almost impossible for enough people to get through the ferry gates to in any manner overcrowd the boats, and by 7 p.m. the ferry service, so far as passengers were concerned, had become normal. The regular schedules provide for the movement of all passenger train service within 20 hours during each 24. All trains during the celebration were handled within these hours. Deducting the hour and a half that traffic was stopped on the day of the arrival of the fleet, the entire traffic of that day was handled in 18 hours and 30 minutes.

Throughout the period covering the fleet celebration no trains were more than a few minutes off schedule, there was no detention to suburban trains or steamers, and no accident or mishap of any kind occurred.

The Traffic Club.

The Secretary has sent out circulars announcing that the Traffic Club of New York will hold a clambake at College Point, L. I. (Witzel's Point View Island), July 11. The program includes a ball game between the Industrials and the railroad and steamship representatives; also a number of running races.

Freight Car Balances and Performances in February, 1908.

The American Railway Association Committee on Car Efficiency has issued Bulletin No. 26 covering car balances and performances for February, 1908, the summary of which is given herewith. The committee says:

"As reported in our bi-weekly bulletins of car surplus and shortage, there was a slight reduction in the number of surplus available cars, the surplus averaging 333,220 during February as against 342,170 in January. This decrease is more than offset, however, by an increase in the percentage of cars in shop, making the total number of idle cars greater in February than in January. The surplus available cars equalled 15.73 per cent. of the total revenue cars, which added to the 6.57 per cent. reported as in bad order, makes a total of 22.30 per cent., or 472,504 idle cars all on reporting roads during February. Allowing for the normal percentage of shop cars, (5.02 per cent.) and adjusting the car days accordingly, an average daily mileage of 23.8 per car is obtained, which is slightly lower than the adjusted average for January.

"The averages shown, which are based on the total cars on line continue low, although there is a slight increase in the average daily earnings per car.

"The homeward movement of cars continued, and the cars reported on their home lines increased to 74 per cent. of the

FREIGHT CAR EFFICIENCY, FEBRUARY, 1908.

Railroad-owned cars:	New England.	New York, New Jersey, Del., Md., Eastern Pa.	Ohio, Indiana, Mich., Western Pa.	Virginia, W. Va., No. and So. Carolina.	Ky., Tenn., Miss., Ala., Ga., Fla.	Iowa, Ill., Wis., Minnesota.	Montana, Wyo., Neb., Dakotas.	Kansas, Colo., Okla., Ind. T., Mo., Ark.	Texas, Louisiana, N. Mex.	Oregon, Idaho, Nev., Cal., Arizona.	Canadian Lines.	Grand total.
Revenue freight cars owned	67,465	667,376	279,822	135,948	166,226	373,057	15,971	140,106	26,089	113,730	96,660	2,082,450
Average number cars on line	52,043	478,036	216,324	99,609	122,725	294,371	6,168	103,957	17,409	68,179	73,817	1,532,639
Average foreign cars on line	21,461	148,312	66,495	31,575	41,099	68,339	9,023	22,373	18,331	37,537	20,758	485,303
Total cars on line	73,504	626,348	282,820	131,184	163,824	362,710	15,191	126,330	35,740	105,716	94,575	2,017,942
Excess	6,039	.....	2,998	.....	.....	.....	.....	.....	9,651	.....	.....	.....
Per cent. cars on line to total owned:												
Home	77	72	77	73	74	79	39	74	67	60	76	74
Foreign	32	22	24	23	25	18	56	16	70	33	22	23
All railroads	109	94	101	96	99	97	95	90	137	93	98	97
Private cars on line	2,830	41,596	14,217	2,575	6,496	10,365	978	4,198	2,260	10,980	4,418	100,913
Total cars on line	76,334	667,944	297,037	133,759	170,320	373,075	16,169	130,528	38,000	116,696	98,993	2,118,855
Per cent. of cars in shop	4.78	6.01	7.89	7.25	4.66	5.58	5.02	11.86	6.11	5.97	4.60	6.57
Number of freight engines owned	1,152	9,842	3,752	2,251	2,524	6,250	445	2,486	642	2,290	2,083	33,717
Av. cars on line per freight engine owned	66	68	79	59	67	60	36	53	59	51	48	63
Total freight car mileage	31,922,814	387,313,876	140,786,514	66,065,708	98,149,092	219,817,251	15,806,888	76,281,123	25,091,732	88,880,675	55,778,919	1,205,894,592
Average miles per car per day	14.4	20.0	16.3	17.1	19.9	20.4	33.7	20.2	22.8	26.4	19.5	19.7
Per cent. loaded mileage	72.0	64.7	61.8	65.4	64.8	69.9	70.5	60.9	64.3	68.3	77.3	66.5
Ton-miles of freight, including Co. frt.	315,760,939	5,683,866,252	1,834,148,965	804,663,190	1,288,617,357	1,398,206,209	206,061,938	623,853,974	213,291,977	1,249,716,045	816,545,784	14,434,732,630
Average ton-miles, including Co. frt.:												
Per car-mile	9.9	14.7	13.9	12.2	13.4	12.3	13.6	12.5	12.3	14.1	14.6	13.7
Per loaded car-mile	13.7	22.7	22.4	18.6	18.2	18.5	19.3	20.8	19.4	20.6	18.9	20.3
Per car per day	143	295	293	202	265	270	471	238	297	371	284	271
Gross freight earnings	$3,774,483	$33,183,919	$10,797,302	$6,450,996	$9,662,690	$15,489,788	$1,881,294	$5,528,614	$2,831,900	$10,503,640	$4,807,316	$104,911,942
Average daily earnings: Per car owned	$1.93	$1.71	$1.33	$1.64	$2.04	$1.86	$4.06	$1.96	$3.77	$3.19	$1.71	$1.86
Per railroad owned car on line	1.77	1.83	1.32	1.70	2.07	1.91	4.27	2.18	2.74	3.44	1.75	1.91
All cars on line	1.71	1.71	1.25	1.66	1.99	1.85	4.01	2.11	2.58	3.12	1.67	1.82

total number owned. The per cent. of loaded mileage, which had decreased steadily since the first appearance of a surplus, shows a decided improvement, but it is still considerably below normal and the excess empty haul during this month as compared with October, 1907, amounted to 5.4 per cent. of the total freight car mileage, or 77,241,254 miles.

"The reduction of the per diem rate to 25 cents, pending the decision of the Commission on Interchange of Freight Cars, which was approved at the special session of the association, February 7, 1908, may have contributed to this result, even though the reduced rate was not effective until March 1. There are indications, however, that the possible effect of this action was in a measure offset by an increase in the number of surplus cars and further falling off of revenues, and that the improvement in loaded mileage was partially accomplished by the unnecessary transfer of through lading at junction points. This expedient, which was used during times of car shortage by many originating roads, for the purpose of keeping their cars at home, was quite generally resorted to for directly opposite reasons when cars became plentiful. From a broad viewpoint, the transfer of car-load freight from a car in good condition to another car of the same class is indefensible. The extension of this practice is a distinct step backward, deplorable under any circumstances and particularly vicious at a time when revenues are impaired by general depression. The railroad manager can hardly be expected to foster altruistic sentiments and his official actions are naturally governed by his conception of his duty to his corporation. But individual gain at the expense of general loss denotes a lack of that co-operation between railroad managers by which not only the general but the individual welfare would be enhanced.

"During normal times, the number of loaded cars interchanged between roads in the association approximates 150,000 daily. At an expense of but $2 per car, the cost of transferring this number of loads would equal $9,000,000 per month. Further, the detention would be equivalent to 4,500,000 days per month to the lading and possibly twice that number to the cars, while the damage to freight subjected to transfer and the inconvenience to the shipping public would be no small factors. There are no figures available showing the amount of unnecessary transferring done during the recent period of unparalleled car surplus, but information which has reached us from various sources indicates that it was by no means inconsiderable. One vice-president, in a letter to this committee commenting on the excess empty mileage and the unnecessary transfer of cars said: 'An extreme illustration of the combination of these two evils would be where a load in a foreign car is transferred to a home car and both are forwarded to the foreign line owning the foreign car. With the declining business, and the enormous number of idle cars now on the rails of all railroads in this territory, unless the great loss brought about by these practices to all lines is clearly and thoroughly pointed out and understood by the higher officers of all companies, the practice will result in such loss to the lines that it will undermine and break down per diem.' This letter was written before the special session of February 7, above referred to, and the danger which threatened the per diem agreement was happily averted by the action taken at that session and its subsequent confirmation by letter ballot.

"It would seem, however, that the experience of the past few months has emphasized the need for some concerted action on the part of the railroads looking to the correction of the fundamental evil underlying the specific deficiencies of our present system of car handling."

Injunction Granted.

At Little Rock, Ark., last week Judge Trieber, in the United States Circuit Court, granted the St. Louis, Iron Mountain & Southern a permanent injunction against any attempt of the state board to enforce the provisions of the Baker demurrage law of the last legislature. The court held that the act was void and unconstituttional. The suit was for an injunction to restrain the Railroad Commission from enforcing the penalties for alleged failure of the road to furnish coal cars to certain mines.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Erie is said to have asked for bids on 15 locomotives. This item is not confirmed.

The Western Allegheny is said to be in the market for several locomotives. This item is not yet confirmed.

The Missouri & North Arkansas is reported to have ordered one locomotive from the Baldwin Locomotive Works. This report is not yet confirmed.

The Eastern British Columbia Railway, D. S. Corbin, Spokane, Wash., President, is figuring on two locomotives with the American Locomotive Co.

The International & Great Northern has ordered ten 10-wheel locomotives from the American Locomotive Co. for September delivery. They will have cylinders 20 in. x 28 in.

CAR BUILDING.

The Delaware, Lackawanna & Western is in the market for 100 refrigerator cars.

The Kentucky & Ohio River, Paducah, Ky., is in the market for a number of electric cars.

The Iowa Central is in the market for 200 thirty-ton box cars and 250 forty-ton gondola cars.

The Chicago, Milwaukee & St. Paul is in the market for 2,000 box cars for its Pacific extension.

The Western Allegheny is said to be in the market for several cars. This item is not yet confirmed.

The Allentown & Reading Traction Co., Reading, Pa., has ordered one car from the John Stephenson Co.

The International & Great Northern has ordered 500 box cars of 60,000 lbs. capacity from the American Car & Foundry Co.

The Acme, Red River & Northern has ordered five all-steel gondola cars of 100,000 lbs. capacity from the Bradford Car & Manufacturing Co., Chicago.

The Sun Ning Railroad, China, has ordered 20 freight cars from the Seattle Car Manufacturing Co., Seattle, Wash. Chin Keay, Seattle, represents the railroad in this country.

The Kansas City, Ozarks & Southern expects to place contracts in the near future for rolling stock to equip its new line. J. B. Quigley is General Manager, 309 Duiatt building, Kansas City, Mo.

The Sterling, Dixon & Eastern Electric, Sterling, Ill., reported in the *Railroad Age Gazette* of June 12 as being in the market for four single truck closed cars, has placed the order with the St. Louis Car Co.

The Sparta-Melrose Electric Railway & Power Co., Melrose, Wis., which is promoting an interurban line from Sparta, Wis., northeast to Melrose, wants information as to the adaptability of gasolene-electric cars to passenger and freight service, including the cost of such equipment as compared to electric power equipment and rolling stock.

IRON AND STEEL.

The Seaboard Air Line is said to have ordered 12,000 tons of rails from the Maryland Steel Co.

RAILROAD STRUCTURES.

BALTIMORE, MD.—The Baltimore & Ohio has given a contract to the McLean Contracting Co., Baltimore, for rebuilding the section of Pier 8, Locust Point, which collapsed in April of last year. This pier is 500 ft. long and 160 ft. wide

and will require about 5,000 piles and 3,000,000 ft. of lumber. The contract price was about $350,000.

BILLINGS, MONT.—The Northern Pacific has awarded to Dietz & Dietz the contract for the new passenger station between Twenty-third and Twenty-fourth streets, on Montana avenue. It is said that the improved facilities here will cost about $100,000.

BOCO GRANDE, FLA.—Plans are being made by the Charlotte Harbor & Northern to put up extensive docks and storage bins here.

BUFFALO, N. Y.—The Lehigh Valley and the Buffalo Creek Railroad are receiving bids for the concrete and piling substructure for a bridge to cross the railroad at Hamburg Turnpike, Buffalo. The estimated cost of this structure is $75,000.

DECATUR, ALA.—After a shut-down of three months construction, it is said, was recently resumed by the Southern Railway on a 15-span steel bridge over the Tennessee river.

DAYTON, OHIO.—W. K. Schoepf, President of the Ohio Electric Railway, is leading a movement for building a union interurban passenger station to cost, together with the terminal site, about $500,000. Plans for this improvement were discussed at a meeting of the Dayton Chamber of Commerce last week. Mr. Schoepf is also endeavoring to build a similar structure at Toledo, Ohio, the terminal site having been provided.

IONA, MICH.—The passenger stations and freight sheds of the Grand Trunk and the Pere Marquette were destroyed by fire on June 28; the loss is estimated at $60,000.

LETHBRIDGE, ALB.—The work of erecting the steel for the Canadian Pacific bridge here, which is to be about 300 ft. high, has been started by the Canadian Pacific Bridge Co., of Walkerville, who have the contract.

MEXICO CITY, MEX.—A general readjustment of the station and terminal facilities of the several railroads comprising the government system has been begun since the Mexican Central was acquired by the government. In the cities and towns where separate stations and terminals were maintained by the different roads now comprising the system the physical properties are being consolidated. One station instead of two is being used at Monterey, and this policy is to be adopted at Torreon, San Luis Potosi, Queretaro and probably the city of Mexico. It is said that several stretches of parallel track will be abandoned.

MICHIGAN CITY, IND.—The Chicago, Lake Shore & South Bend (electric) has let contracts to the Cleveland Construction Co., Cleveland, Ohio, for car barns and repair shops.

POPLAR BLUFF, MO.—The St. Louis, Iron Mountain & Southern, it is reported, will build a $35,000 passenger station besides building a freight house.

SANDPOINT, IDAHO.—The Northern Pacific is said to have let the contract to a Minneapolis firm for a 20-stall roundhouse. Work is to be started at once. There will also be a machine and blacksmith shop. The total cost of the improvements, including turntable, storehouses and coal wharves, will be about $30,000.

SASKATOON, SASK.—The Canadian Pacific, it is said, has decided to erect a machine shop to cost about $20,000.

SEATTLE, WASH.—The Chicago, Milwaukee & St. Paul, it is said, has offered $2,000,000 for the site of the Moran Bros. Co.'s shipbuilding plant on the Seattle water front. Greater water frontage is needed in connection with the St. Paul's terminal property.

TEXHOMA, TEX.—The Chicago, Rock Island & Pacific has obtained a permanent injunction against the Texas Railroad Commission restraining it from enforcing an order requiring the establishment of a station at this point. The railroad maintains a station within 1,000 yards of the proposed new structure and will not therefore build an additional depot.

TOLEDO, OHIO.—See Dayton, Ohio.

SUPPLY TRADE NOTES.

C. Kemble Baldwin, formerly with the Robins Conveying Belt Co., Passaic, N. J., is now Chief Engineer of the Robins New Conveyor Co., Old Colony building, Chicago.

The Railroad Safety Signal Co., Wilmington, Del., has been incorporated with $300,000 capital stock by Richard J. Ryan, J. G. Gray and M. B. F. Hawkins, all of Wilmington.

J. A. Werner, for many years locomotive coaling engineer for the Link Belt Co., Philadelphia, Pa., has taken charge of the coaling station department of the Jeffrey Manufacturing Co., Columbus, Ohio.

The Standard Roller Bearing Co., Philadelphia, Pa., has opened a branch sales office at 327 Jefferson avenue, Detroit, Mich., in charge of Ernest L. Smith, recently appointed Western Representative.

Carll Tucker, who has been connected with the sales department of the T. H. Symington Co., Baltimore, Md., for several years, has resigned to accept a responsible position with the General Rubber Co., with headquarters at New York.

R. Ortmann has bought the interest of T. A. Griffin in the Ajax Forge Co., Chicago, manufacturer of frogs, switches and crossings, and succeeds him as President of the company. Mr. Ortmann remains one of the Vice-Presidents of the Griffin Wheel Co., Chicago.

The Beaver Dam Malleable Iron Co., Beaver Dam, Wis., has let contracts to the Alling Construction Co., 72 Madison street, Chicago, for a new office building and pattern vault, ground 50 ft. x 100 ft. This structure is to be absolutely fireproof, the exterior being brick and the interior reinforced concrete.

The Pierce Safety Appliance Co., Wheeling, W. Va., has been incorporated with $500,000 authorized capital stock to make and sell railroad devices, appliances and signal systems. The incorporators are: Franklin A. Pierce and Earl A. Lenkard, of Wheeling; John E. Oswald and John T. Travers, of Bellaire, W. Va., and Wm. McSwain, of Moundsville, W. Va.

The Thomas Brace Rail Co., New York, has been incorporated with $2,000,000 capital to make rails and railroad appliances, build railroads, engage in mining, etc. The incorporators are: E. T. Thomas, 115 Broadway, and John Oehler, 87 Frankfort street, New York; W. A. Campbell, 247 New York avenue; T. H. Ross, 27 Madison street, and C. B. Schellenberg, 220 Duffield street, Brooklyn, N. Y.

Henry F. Vogel, President and General Manager of the Danville Car Co., Danville, Ill., has been elected President and General Manager of the Natural Power Co., of Kirkwood, Mo. He will leave the Danville company within the next 60 days to assume his new duties. Mr. Vogel was formerly Vice-President and General Manager of the St. Louis Car Co., St. Louis, Mo. The Natural Power Co. recently increased its capital stock from $60,000 to $300,000. It makes suction and pressure blowers and centrifugal pumps. It also has a large iron and steel foundry, and will do a general casting business along these lines.

The Bureau of Manufactures, Washington, D. C., has the following inquiries: No. 2,378.—One of the American consuls in Europe reports that requests have been made at the consulate for offers of first class steel by two local firms. One of these concerns desires the steel for the manufacture of machinery and the other more particularly for plates used at crossings of rails and switches. No. 2,382.—Bids will be received until July 6, 1908, by the Isthmian Canal Commission, Washington, D. C., for the supply of dynamite, electric fuses, connecting wire, insulating tape, insulating paint, etc. (Circular No. 450.)

Paul L. Wolfel, who was formerly Chief Engineer of the American Bridge Co., and lately Consulting Engineer for the American Bridge Company of New York, has resigned to become Chief Engineer of the McClintic-Marshall Construction Co., Pittsburgh, Pa., with headquarters at Pittsburgh. Mr. Wolfel was in the employ of the Pencoyd Iron Works from 1888 (from 1892 being Assistant Chief Engineer in the bridge and construction department), until the American Bridge

Co. was formed. He then went to that company and became Chief Engineer one year later. For the last two and one-half years he has been Consulting Engineer.

The Allis-Chalmers Co., Milwaukee, Wis., has received an order from the Railway Institute of Sydney, Australia, for a complete AA-1 equipment with the new type OB governor for use in instructing the men who operate electric street cars. The Government Tramways of Sydney are equipped throughout with Christensen air-brakes and the sample set ordered is for the technical and practical training for employees. The company has also received an order, through Allis-Chalmers-Bullock, Ltd., Vancouver, B. C., for an 8-in. two-stage turbine pump, direct-coupled to a 150-h.p., 2,200-volt, three-phase, 60-cycle induction motor, to be used by the British Columbia Electric Railway, Victoria, B. C., which is installing a new water system for fire protection.

TRADE PUBLICATIONS.

Fireproofing Materials.—The General Fire Proofing Co., Youngstown, Ohio, has recently issued a pamphlet of short talks to architects and engineers concerning the company's metal fireproofing material.

Hoisting Machinery.—The Brown Hoisting Machinery Co., Cleveland, Ohio, has issued Catalogue O, illustrating and describing Brownhoist machinery as adapted for use in handling coal, coke and other materials about gas plants.

Paint.—The June number of *Ruberoid*, published by the Standard Paint Co., Chicago, contains an article on metal preservative paints, briefly describing the advantages of several special paints made by the company.

Steam Shovel News.—The June number contains an interesting article entitled "Cost of Steam Shovel Work on the Hanover & New York Street Railway," also an article by Waldon Fawcett on the "Reclamation Service."

Mine and Quarry.—The June number contains an illustrated article on the improvements in the St. Mary's river, air power economy in a granite quarry, and several other articles. This publication is issued by the Sullivan Machinery Co., Chicago.

Paints, Disinfectants.—The Alcatraz Company, Richmond, Va., in a neat mailing pamphlet describes its black paints and varnishes for use on roofing, steel structures, cars, stacks, etc. Leaflets describing disinfectants made by the same company are also enclosed.

Asbestos Protected Metal.—Catalogue No. 4, regarding the application of asbestos protected metal to the general building trade, and Catalogue No. 48A descriptive of its use in the Robertson box car roof, have just been issued by Asbestos Protected Metal Co., Canton, Mass.

Iron and Steel, Boilers, Tools and Machinery.—The Monthly Journal and Stock List of Joseph T. Ryerson & Son, Chicago, for June contains 144 pages of information for manufacturers and users of machinery and steam boilers, structural iron and sheet metal workers, railroad and mine operators.

Iron and Steel.—A leaflet issued by Joseph T. Ryerson & Son, Chicago, announces their recent occupancy of new general offices and warehouses and the hourly automobile service from their branch office in the Commercial National Bank building to the new general location at Sixteenth and Rockwell streets.

Asbestos and Magnesia Supplies.—The third edition catalogue of J-M asbestos and magnesia railroad supplies has been recently issued by the H. W. Johns-Manville Co., New York. The pamphlet has 180 pages, with many illustrations, showing the application of asbestos and magnesia materials. The company also recently issued a leaflet describing Ferro cement, and one on pipe covering.

Car Lighting Cells.—Catalogue C, of the Electric Storage Battery Co., Philadelphia, Pa., gives a full description of the two general types of elements, the Chloride and the Tudor accumulators, for use in connection with any of the three methods now in vogue for electrically lighting passenger trains, being the straight light, the axle light and the head end systems. Complete data on some 21 different types of accumulators is given.

Electric Signals and Indicators.—Catalogue No. 6 of the Hall Signal Co., New York, calls especial attention to the improved electric semaphore signal, operated by the style "F" mechanism. The catalogue has some 97 pages, containing revised price lists covering the single, double and three-position mechanisms, motor, masts, disk signals, switch indicators, commutator instruments, circuit controllers, etc. The catalogue is well illustrated with half-tone and line cuts.

Railway Converter Sub-Stations.—The General Electric Co., Schenectady, N. Y., has just issued bulletin No. 4,593, devoted to railway converter sub-stations. The publication gives a general description of the various pieces of sub-station apparatus, including rotary converter transformers, reactances, blowers, cables, switchboards, etc., and includes illustrations of converter stations operated by various well-known railways. It contains also plans and elevations showing different arrangements of sub-station apparatus.

Traveling Engineers' Association.

The sixteenth annual convention of the Traveling Engineers' Association will be held in Detroit, Mich., beginning on Tuesday, August 25, at 9.30 a.m. Headquarters will be at the Hotel Cadillac. The capacity of this hotel is about 300, and those desiring accommodations at headquarters are requested by the Secretary to make application for their rooms early in order not to be disappointed. The Pullman Company will give passes for return trip to persons who have paid full fare to the convention, who present receipts showing the fare paid and who are properly identified as bona fide employees of railroads legally entitled to reduced rates under the Hepburn act.

Railroad Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

Theodore Brent, the recently appointed Assistant to the Third Vice-President of the Chicago, Rock Island & Pacific and the St. Louis & San Francisco, was born in 1874, at Muscatine, Iowa. He began railroad work in 1896 as stenographer to the Assistant General Freight Agent of the Kansas City, Fort Scott & Memphis, now part of the St. Louis & San Francisco. Later he was appointed Secretary to F. A. Ridell and to Mr. Fletcher, Traffic Manager of the K. C., F. S. & M. In 1900, when A. A. Dodge succeeded Mr. Fletcher as Traffic Manager, he retained Mr. Brent as Secretary. When Mr. Dodge was made Freight Traffic Manager of the St. Louis & San Francisco, in 1901, Mr. Brent was made chief clerk. In 1905 Mr. Brent was appointed chief clerk to the Third Vice-President, which position he held until his recent appointment.

Theodore Brent.

G. W. Ristine has been elected President of the Tennessee Central. See this company under Railroad Financial News.

W. J. Henley, Acting President of the Chicago & Western Indiana and of the Belt Railway, has been elected President of both companies.

Operating Officers.

E. I. Bowen, Superintendent of the Allegheny and Bradford divisions of the Erie, has been appointed Superintendent of the Delaware and Jefferson divisions, succeeding W. C. Hayes, assigned to other duties. Theodore Mackrell succeeds Mr. Bowen.

P. H. Houlahan, General Superintendent of the Chicago & Alton, has been appointed General Manager, with headquarters at Chicago. He is now General Manager of both the Alton and the Toledo, St. Louis & Western. Mr. Houlahan was born in 1855 at Ottawa, Ill., and began railroad work in 1867 as a water boy on a track construction gang. By 1875 he had become a ticket agent and five years later conductor (on the Fox River branch of the Chicago, Burlington & Quincy). From 1881 to 1886 he was on the St. Louis division of the Burlington, rising from train despatcher to Assistant Trainmaster and then to Trainmaster. In 1886 he went to the St. Louis, Arkansas & Texas, now part of the St. Louis South-Western, where he was Master of Transportation on the Missouri & Kansas division, but he soon returned to the Burlington, where he became Superintendent. From 1892 to 1905 he was Superintendent of the Hannibal & St. Joseph, a part of the Burlington system. From there he went to the Toledo, St. Louis & Western as General Manager and Superintendent. He was appointed also General Superintendent of the Chicago and Alton in January, 1908.

P. H. Houlahan.

T. B. Coppage, Superintendent of the Southeastern division of the St. Louis & San Francisco, has been appointed Superintendent of the Northern division, with headquarters at Fort Scott, Kan. J. G. Lorton, Superintendent of the Northern division, succeeds Mr. Coppage, with headquarters at Birmingham, Ala.

M. Hinchy has been appointed Acting Trainmaster and Chief Train Despatcher of the Canadian Pacific at Farnham, Quebec, temporarily succeeding W. A. Rose, assigned to other duties. R. G. Wilton, Chief Despatcher at Brandon, Man., has been transferred to Kenora, Ont., and is succeeded by E. G. Trump, Chief Despatcher at Winnipeg, Man.

R. W. Willis, District Engineer of the Chicago, Burlington & Quincy at Chicago, has been appointed Superintendent of Car Service of the Indiana Harbor Belt, with office at Gibson, Ind., succeeding T. H. Williams, resigned. He will have charge of car distributing, car records, per diem and mileage accounts, and all correspondence relating to these matters.

C. E. Carson, the recently appointed Superintendent of Terminals of the Mexican Central at Tampico, Mex., was born in 1867. He began railroad work as switchman in 1885 on the Kansas City, Fort Scott & Memphis, now part of the St. Louis & San Francisco. He was made assistant yardmaster in 1886 and became chief clerk in the Superintendent's office in 1888. From 1891 to June, 1893, he was conductor and general yardmaster. From June, 1893, to 1897, he was chief clerk to the Superintendent of the Terminal Railroad Association of St. Louis. In 1897 he was made Superintendent of the Missouri Pacific at Kansas City, Mo., and in 1902 was transferred as Superintendent to St. Louis. On December 1, 1903, he was appointed Superintendent of the Colorado & Southern at Denver, Colo. Three years later he went back to the Missouri Pacific as Superintendent at Kansas City, which position he held until his recent appointment. This record corrects a recent item in these columns.

John A. Emmart, who was recently appointed Assistant General Manager and Purchasing Agent of the Coal & Coke Railway, was born in 1874 in West Virginia. After a common school education, he began railroad work in 1892 on the West Virginia Central & Pittsburgh, now part of the Western Maryland, as a clerk in the car record office. The next year he was made clerk to the cashier, and in 1894 he was made stenographer and clerk to the Secretary, Treasurer and Purchasing Agent. In 1895 he was promoted to chief clerk to the Assistant General Manager and Purchasing Agent. Four years later he became cashier and paymaster. In December, 1899, he again became chief clerk to the Assistant General Manager. In 1903 he was appointed chief clerk to the General Manager of the Coal & Coke Railway, and three years later was made Purchasing Agent of this road. On February 1, 1908, he was appointed also Acting Assistant General Manager, which position he held until his recent appointment as Assistant General Manager and Purchasing Agent.

Traffic Officers.

J. R. Crooks has been appointed Freight and Ticket Agent of the Pennsylvania Lines West at Dola, Ohio, succeeding W. E. Rose.

Frank Priest, Traveling Passenger Agent of the Erie, at Boston, Mass., has been transferred, as Traveling Passenger Agent, to Buffalo, N. Y.

J. D. Bateman has been appointed General Agent of the Louisville & Nashville at Little Rock, Ark., succeeding H. C. Bateman, deceased.

T. L. Lawrence has been appointed General Agent of the Chicago, Burlington & Quincy at Leavenworth, Kan., succeeding E. Marshall, resigned.

W. H. Comer, who resigned recently as General Agent of the Chicago Great Western at Butte, Mont., has gone into land and live stock business in Helena, Mont., with Lewis Penwell.

H. M. Tait, Assistant General Agent of the Atlantic steamship lines of the Canadian Pacific at Winnipeg, Man., has been appointed General Agent there, succeeding W. P. F. Cummings.

Stewart C. Leake, Traveling Freight Agent of the Richmond, Fredericksburg & Potomac and the Washington Southern at Richmond, Va., has been appointed Commercial Agent at Richmond.

George D. Maxfield, District Passenger Agent of the Wabash at Indianapolis, Ind., has been appointed Passenger Agent at Buffalo in charge of passenger business in New York state, exclusive of New York City.

W. B. Shirk has been appointed Commercial Freight Agent of the Missouri Pacific, with headquarters at Sedalia, Mo. J. W. Hailey has been made Commercial Freight Agent of the same company, with headquarters at Alexandria, La.

W. R. Haldane, Division Freight Agent of the Canadian Pacific at Detroit, Mich., has been appointed General Freight Agent of this road at Vancouver, B. C., succeeding B. W. Greer, resigned. Edward Olson succeeds Mr. Haldane.

C. E. Tenny, City Passenger and Ticket Agent of the Grand Trunk at Quebec, Que., has been appointed Passenger and Ticket Agent at Portland, Me., succeeding J. Lawlor. G. H. Scott, Freight Agent at Quebec, Que., suceeds Mr. Tenny. R. P. Smallhorn succeeds Mr. Scott.

F. S. Brooks, Live Stock Agent of the Atchison, Topeka & Santa Fe at Ft. Worth, Tex., has been appointed Assistant General Freight Agent at Galveston, effective July 1, succeeding J. R. Dillon, resigned. The position of Live Stock Agent at Ft. Worth has been abolished.

G. Roy Hall, the recently appointed Traffic Manager of the Duluth, Rainy Lake & Winnipeg, was born April 8, 1871, at Naperville, Ill. He had a public school education and began railroad work in 1893 on the Wisconsin Central. When the offices at Chicago were consolidated with the Northern Pacific, he went to the latter company. In 1897 he went to the Canadian Pacific, where he remained for eight years. In 1905 he went into private business. Later in that year he worked for the Merchants Committee on Railroad Terminals of Chi-

cago. In 1906 he was appointed General Northern Agent of the North & South Despatch, which position he held until his recent appointment.

Engineering and Rolling Stock Officers.

J. J. Waters has been appointed Superintendent of Machinery of the Mexican Central, with headquarters at Aguascalientes, Aguas., Mex., succeeding Ben. Johnson, resigned.

S. A. Jordon, Division Engineer of Maintenance of Way of the Baltimore & Ohio at Philadelphia, Pa., has been appointed Engineer Maintenance of Way at Baltimore, Md., succeeding H. E. Hale, resigned.

R. J. Hood has been appointed Roadmaster of the Rapid City section, the Miniota and Lenora branches and the Brandon yard of the Canadian Pacific, succeeding J. Canty, with headquarters at Brandon, Man.

R. C. Harris, Engineer of Maintenance of Way of the Pennsylvania Lines West at Toledo, Ohio, has been appointed Engineer of Maintenance of Way of the Cleveland, Akron & Columbus, with office at Akron, Ohio, succeeding A. B. Jones, resigned.

H. B. Walkem, Resident Engineer, District 2, of the Canadian Pacific, has been appointed Assistant Division Engineer of the Pacific division, with headquarters at Vancouver, B. C., succeeding R. A. Bainbridge, promoted. F. P. Wilson succeeds Mr. Walkem, with office at Vancouver.

R. G. Kenly, the recently appointed Engineer of Maintenance of Way of the Lehigh Valley, was born March 13, 1866, at Ritchie Mines, W. Va., and is a graduate of the Baltimore State College. He began railroad work in 1885 as rodman and levelman on the Annapolis & Baltimore Short Line, now part of the Maryland Electric. Later in the same year he was appointed levelman of the Baltimore & Eastern Shore, now part of the Baltimore, Chesapeake & Atlantic. On October 1, 1886, he was appointed assistant supervisor of the Northern Central. On March 15, 1891, he was appointed supervisor of the Radford division of the Norfolk & Western. Two years later he was made Assistant Engineer of the same division and, in 1897, he became Assistant Trainmaster of this division and of the Pulaski division. The next year he was made assistant to the Chief Engineer of the West Virginia Central & Pittsburgh, now part of the Western Maryland. Later in that same year he was appointed draftsman and engineer in charge of construction of the Philadelphia & Erie, now part of the Pennsylvania, and the Northern Central. In 1899 he was made supervisor of the Lehigh division of the Lehigh Valley, and later in that year Division Engineer of the Lehigh and New Jersey divisions of that road. In 1904 he was made Trainmaster of the same divisions and was later made Superintendent and Chief Engineer of the Lehigh & New England, which office he held until his recent return to the Lehigh Valley.

Special Officers.

W. F. Perdue has been appointed Instructor and Examiner on standard rules and signals of the Mexican Central. The employees now in the service and all applicants for employment, who will be subject to these rules and signals, will be required to pass the standard examination. Mr. Perdue will report direct to the General Manager.

OBITUARY.

George S. MacKinnon, Assistant Master Mechanic of the Canadian Northern at Winnipeg, Man., died on May 13 at the age of 54 years.

W. R. Peabody, formerly General Freight Agent of the St. Louis, Iron Mountain & Southern, died at St. Louis on June 22. He had been with the Missouri Pacific system since 1890, but for the past two or three years lived in retirement on account of ill health.

George Hackney, Superintendent of Machinery of the Atchison, Topeka & Santa Fe from 1877 to 1891, died at Topeka, Kan., on June 19, aged 82 years. Mr. Hackney was one of the pioneer railroad men of the West. He was born in England and came to America in 1853. He was at one time Shop Foreman for the Menominee Locomotive Works at Milwaukee, Wis., and also Shop Foreman of the Chicago, Milwaukee & St. Paul. He was later Master Mechanic on the Chicago & North-Western and on the Chicago, Milwaukee & St. Paul.

Railroad Construction.

New Incorporations, Surveys, Etc.

Alexandria, Leesville & Lufkin.—Organized this spring to build from Lufkin, Tex., east to Alexandria, La., about 140 miles. Preliminary surveys now being made and construction work is to be started shortly. The first section to be built will be from Alexandria to Leesville. (May 29, page 747.)

Ashville & Greenville (Electric).—Contracts, it is said, are to be let about the middle of August to build an electric line from Ashville, N. C., south via Hendersonville to Greenville, S. C., 60 miles. J. F. Rowland, President, 301 Oatch building, Nashville, N. C.

Ballinger & Abilene.—Negotiations, it is said, are pending to finance this proposed line. The route is from Ballinger, Tex., north to Abilene, 55 miles. Work is to be started at once. W. J. McDaniel, Chief Engineer, Ballinger. (Nov. 22, p. 636.)

Bloomington, Pontiac & Joliet (Electric).—Financial arrangements, it is said, have been made to extend this road, now in operation from Dwight, Ill., southwest to Pontiac, 20 miles, from the latter place southwest to Bloomington, 35 miles, and work is to be started at once. (Nov. 8, page 572.)

Canadian Northern.—The Niagara, St. Catharines & Toronto, which uses both steam and electricity as motive power, operating lines from Niagara Falls, N. Y., to Stamford, Ont., Thorold, Merritton and St. Catharines to Port Dalhousie, 16 miles; Thorold through Fonthill to Welland, 11 miles; and a local line at Niagara Falls, from Bridge street through Niagara Falls, Niagara Falls Center, Drummondville and Lundy's Lane to Falls View and to North Montrose Junction, six miles, has been taken over by the McKenzie-Mann interests. During 1907 and 1908 the company built from Thorold via Fonthill to Welland, 11 miles. Permission has been given to build additional lines from St. Catharines via Burlington Beach and Hamilton to Toronto; from St. Catharines to Niagara-on-the-Lake; from Niagara Falls to Fort Erie; from Fort Erie to Port Colborne; from Welland to Port Colborne, and from Welland to Brantford. Plans for the proposed extensions have been filed, with the exception of those from St. Catharines to Toronto, and from Fort Erie to Port Colborne.

Charlotte Harbor & Northern.—Work on the extension from Arcadia, Fla., north to Plant City, 60 miles, is expected to be started this year. Surveys made and rights of way secured. (March 13, p. 390.)

Chicago & North-Western.—About 300 men are at work west of Miller, S. Dak., putting in heavier track and ballasting the roadbed. When this work is finished and the section of 40 miles from Miller east to Huron is completed, the entire line will be laid with heavy rails from Black Hills east to Chicago.

Colorado & Nevada.—Organized to build a line from Twin Falls, Idaho, south to Wells, Nev., on the Southern Pacific, 114 miles. There is to be a tunnel about 1,700 ft. long. H. L. Hollister, President, Chicago, Ill.

Colorado & Southern.—The Denver & Interurban electric line from Denver, Col., northwest to Boulder, 44 miles, was opened for traffic on June 23. A branch line from Marshall southwest to Eldorado Springs is to be put in service this week. (June 20, 1907, p. 900.)

Denver & Interurban.—See Colorado & Southern.

Denver, Laramie & Northwestern.—Contract said to have been let to Frederick P. Orman, Denver, Colo., for building 64 miles of road. The first section from Denver to Fort Collins, 125 miles, is expected to be completed this year. R. H. Dwyer, General Manager, Denver. (May 15, page 687.)

DULUTH & NORTHEASTERN.—Plans filed for an extension from the present terminus at Cloquet, Minn., east to Duluth, 20 miles.

GRAND RAPIDS & NORTHWESTERN.—Work on the reconstruction and extension of the present line is expected to begin about July 1. (See this company under Railroad Financial News.)

GRAND TRUNK PACIFIC.—Sub-contracts have been let by Foley, Welch & Stewart on the first 100 miles from Prince Rupert, B. C., east, as follows: Ross and Carlson, one mile; Prince Rupert Construction Co., four miles; Angus Stewart, one mile; A. L. McHugh, four miles; J. E. Bostrom, five miles; Neil Keith, three miles; McDonald & McAlister, five miles; M. Shady, three miles; Smith Brothers, three miles; Angus Steward, three miles; Dan Stewart, two miles; Fred Peterson, three miles; Stein & Harstone, three miles. This list follows the order in which the contracts were let from Prince Rupert. About 15 miles of sub-contracts remain to be let. (Juue 26, p. 409.)

IDAHO & WASHINGTON NORTHERN.—Said to be making surveys for the proposed extension along the Pend d'Oreille river, about 63 miles. F. A. Blackwell, President, Coeur d'Alene. (Dec. 6, page 701.)

INTERNATIONAL LUMBER COMPANY'S ROAD.—The logging railroad now in operation for five miles from Campbell River, B. C., is to be extended 25 or 30 miles into the interior of the island of Vancouver. C. H. Cobb, President; F. H. Parks, Engineer, Seattle, Wash.

JOPLIN UNION DEPOT CO.—Application has been made for a charter for the Joplin Union Depot Co., of Joplin, Mo., capitalized at $500,000, to erect and operate a union station in Joplin. The capital stock is divided into 5,000 shares, par value $100, to be held as follows: By the Missouri & North Arkansas, 2,498 shares; Atchison, Topeka & Santa Fe, 2,497 shares; W. B. Jansen and Robert Dunlap, of Chicago, one share each; Thomas B. Morrow, of Kansas City, Mo., one share; Charles Gilbert and W. S. Dawley, of St. Louis, Mo., one share each.

KANSAS CITY, MEXICO & ORIENT.—Construction work is being pushed on the Pacific and Mountain divisions in Mexico. The grade is finished for over 38 miles east from Fuerte Sinaloa, and track laying is in progress. The grading force on the Mountain division has been increased. The first section from Topolobampo north is being improved.

KANSAS-COLORADO (ELECTRIC).—An officer writes that the survey from Canon City, Colo., to Pueblo, Rocky Ford, La Junta and Garden City, Kan., is progressing rapidly. The line will be about 350 miles long. (June 5, p. 47.)

LA DICHA & PACIFIC.—The concession granted by the federal government to this company has been amended to provide that 12½ miles must be finished by February 25, 1909, and an additional 12½ miles finished every year thereafter up to 1914, when the entire line must be finished. The general offices are at La Dicha, Guerrero.

LONG ISLAND.—The improvements to be completed within a year and a half, include: main line improvements, from Jamaica to Sunnyside yard, eventually six tracks, but at this time only two tracks are being added to the double track line now in use; building the Glendale cut-off from Glendale Junction to Whitepot station, which will provide a direct line from the Rockaway Beach division to the Sunnyside yard; double tracking the north shore division from Flushing to Port Washington; elimination of grade crossings, and building a big terminal station and office building at Jamaica. It is intended to make Jamaica the western terminus of all steam service. This means the electrification of the entire westerly division, about 105 miles of track. The large terminal station at Jamaica will have seventeen tracks passing through it, which will allow for convenient transfer of pasengers from steam to electric trains.

MESA VALLEY & EL PASO (ELECTRIC).—Organized in Texas with $1,000,000 capital to build an electric line from El Paso, Tex., northwest to Lascruces, N. Mex., 44 miles. F. Martinez and R. F. Burges, of El Paso, are interested.

MEXICAN ROADS.—The concession which General Julio M. Cervantes recently secured from the government for the construction of a railroad from San Mateo, on the Mexican Central, through the Huasteca country in the state of Vera Cruz, has passed to the control of Leon Bargas Navarro and Vicente B. Trevino, representing capitalists who will build the road. The proposed line, which will be about 100 miles long, will cross a number of large streams and will afford an outlet for many plantations.

Right of way secured and authority granted by the government to the Maine & Nebraska Mining Co. to build a 2-mile line from Balsas river bridge, Guerrero, to the mines of the company.

The Huasteca Petroleum Co., with office in Mexico City, has been granted a concession by the federal government to build a railroad and oil pipe line to connect its oil field with a port of the Gulf of Mexico.

MISSOURI, OKLAHOMA & GULF.—An officer writes that construction work has been started on the line from Lamar, Okla., south to Colvin. It is intended to continue construction to Denison, Tex., but the contracts being let at present are confined to the extension between Lamar and Colvin, 15 miles.

NEVADA ROADS.—Residents of Kearney, Neb., represented by E. H. Morey, are making preliminary surveys for a line from Prosser, Neb., northwest to Shelton, thence via Buckeye valley and the Loup valley through Custer and Logan counties to Gandy.

NIAGARA, ST. CATHARINES & TORONTO.—See Canadian Northern.

NORTHEASTERN (ELECTRIC).—Incorporated in Illinois with $50,000 capital to build an electric line from Woodstock, through the counties of McHenry and DeKalb, to Sycamore. The incorporators include C. G. Lumlay, I. D. Stevens, E. C. Spinny, E. D. Harang and others.

PARRAL & DURANGO.—Announcement is made by D. M. Dudley, the contractor building a 20-mile extension of this road, that the work will be finished in about two months. James I. Long, of Parrall, General Manager.

PORT ARTHUR & HOUSTON SHORT LINE.—Organized about three years ago with $200,000 capital to build a line from Port Arthur, Tex., via LaPorte, towards Houston, 85 miles. Vice-President C. S. Cleaver is reported as saying that financial arrangements have been made to carry out the work, which is to be started soon from LaPorte, by C. L. Dwyer, contractor, of Houston. Winfrey & Schlafli, of Houston, will do the engineering work, and the Cullen Friedstadt Co., Chicago, will build the concrete bridges. A. O. Blackwell, Secretary, LaPorte; H. Fallsingburg, Chief Engineer, Port Arthur.

SAN RAFAEL & ATLIXCO.—This company will extend its line east 25 miles to Pueblo, Mex., and is now building a short line into Mexico City. A 20-mile branch from Atlixco to Santa Catalina was recently finished. Work also under way on a 20-mile branch from Santa Catalina to Apapasco. The office of the company is in Mexico City. Francisco Varza, President; Thomas Mancera, Vice-President and General Manager; A. Camarena, Chief Engineer, and Arturo Mancera, Resident Engineer.

SPARTA-MELROSE ELECTRIC RAILWAY & POWER CO.—This company, with headquarters at Melrose, Wis., is promoting the construction of an interurban traction line between Sparta, Wis., and Melrose. There are two routes under construction, one 28 miles long, and the other 18 miles. Town bonds amounting to $63,000 have been voted in furtherance of this work and another bond issue amounting to $45,000 will be passed on soon. The officers of the company are: Charles Newland, President, Melrose; James Cole, Vice-President; Howard Teasdale, Secretary, Sparta, Wis., and W. A. Sholes, Treasurer.

WYOMING & SOUTHWESTERN.—Incorporated in Wyoming with $2,350,000 capital to build a line from the Battle Lake mining section of southern Carbon county, Wyo., into southern Colorado. It is controlled by the Penn-Wyoming Copper Co., operating a smelter in Encampment, and other mining property in Carbon county. It is said that the line is to be built as an extension of the Saratoga & Encampment, now extending its main line from Walcott, Wyo., south to Encampment.

Railroad Financial News.

Chicago, Burlington & Quincy.—The New York Stock Exchange has listed $16,000,000 general mortgage 4 per cent. bonds of the $300,000,000 issued recently authorized. The proceeds will be used to pay the notes given for money borrowed and spent to acquire other roads and for additions and betterments as follows:

For additional equipment	$7,500,000
Right of way and station grounds	500,000
Additional tracks and terminals	1,000,000
Track elevation	600,000
Reducing grades and changes of line	800,000
New buildings and shops	200,000
Bridges and culverts	300,000
Purchase of Sioux City & Western	5,500,000
Total	$16,400,000

Chicago Consolidated Traction.—David R. Forgan and John M. Roach have been appointed Receivers on the application of the Central Trust Co., New York, because the traction company defaulted on the interest payment due June 1 on its $6,750,000 general mortgage 4½ per cent. bonds.

Cincinnati, Hamilton & Dayton.—The Four Per Cent. Refunding Bondholders' Committee announces that over 80 per cent. of the $11,558,000 outstanding bonds have been exchanged for 5½-year purchase money 4 per cent. notes maturing July 1, 1913. (April 10, 1908, p. 525.)

Detroit, Toledo & Ironton.—The Ramsey Protective Committee for the 4½ per cent. collateral trust notes of 1905, secured by Ann Arbor stock, has obtained a temporary injunction forbidding the sale of the Ann Arbor stock. (Feb. 7, 1908, p. 201.)

Erie.—J. P. Morgan & Co., on July 1, were continuing to buy at par the coupons due on that date of the $35,000,000 Erie prior lien 4 per cent. bonds and the $44,012,000 Erie general lien 4 per cent. bonds. (June 19, 1908, p. 210.)

Grand Rapids & Northwestern.—This company has filed a mortgage securing $5,000,000 50-year 5 per cent. bonds, $1,000,000 of which is to be reserved for improvements and other expenses. The company owns no road in fee, but owns the entire capital stock of the Mason & Oceana, which owns a narrow gage road from Ludington, Mich., to Beaver, about 25 miles. The Grand Rapids & Northwestern proposes to build a steam road from Grand Rapids, Mich., to Ludington.

Great Northern.—The regularly quarterly dividend of 1¾ per cent. has been declared and holders of stock scrip representing the right to subscribe for new stock may participate in the dividend distribution by converting their scrip into stock by October 1.

Hudson Companies.—Harvey Fisk & Sons, New York, are offering $1,000,000 6 per cent. coupon notes, due August 1, 1910, at 98½. These notes are secured by $10,000,000 4½ per cent. bonds.

Illinois Central.—J. T. Harahan, President, has issued the following circular, under date of June 27: "The Illinois Central Railroad Company and the Southern Railway Company, having elected not to exercise the option to purchase the control of the Tennessee Central Railroad Company, the Illinois Central Railroad Company will at midnight of June 30, 1908, cease to operate that part of the line of the Tennessee Central Railroad Company between Hopkinsville, Ky., and Nashville, Tenn."

The executive officers of the Southern and the Illinois Central have issued a statement setting forth the reasons for discontinuing the operation of the Tennessee Central. They say: "In 1905 the Southern Railway and the Illinois Central entered into a contract by which they purchased the prior lien bonds of the Tennessee Central and obtained an option for three years on the general mortgage bonds of the latter company, the bonds of the Nashville Terminal Company, and practically all the capital stock of these companies except that held by counties and municipalities. Pending this option, they have paid interest on these securities in the nature of rent, and have operated the property under an agreement to keep it free from debt. The option expires July 1. The operation has not been remunerative, and has not been such as to warrant the purchase of the securities under the option. These companies were anxious, however, to continue the effort to develop the property, and their relation with the city of Nashville if they consistently could do so. They therefore proposed to the owners of the property a plan in detail for a long term lease of the property on a basis which, while involving some immediate sacrifice, would in their opinion ultimately be reasonably fair and profitable to both parties. This plan was, however, declined by the owners of the property. The result has been a complete failure of negotiations, so far as concerns the continuance of our existing relations to the properties, so that steps are now being taken to turn them over to their owners in such a way as to produce the least inconvenience to the public." George W. Ristine has been elected President of the Tennessee Central.

Joplin Union Depot Co.—See this company under Railroad Construction.

Manhattan Railway (New York).—Redmond & Co., New York, who recently bought $11,712,000 consolidated mortgage 4 per cent. bonds of 1890-1990 of the Manhattan Railway, issued to retire an equal amount of Metropolitan Elevated first mortgage 6 per cent. 30-year bonds due July 1, 1908, are offering to exchange at 96 the Manhattan consolidated bonds for the Metropolitan bonds. (June 19, p. 210.)

Mobile & Ohio.—A semi-annual dividend of 1½ per cent. on the stock has been declared, reducing the annual rate from 5 per cent. (the amount paid in 1907) to 3 per cent.

National Railways of Mexico.—Kuhn, Loeb & Co., Speyer & Co., Ladenburg, Thalmann & Co. and Hallgarten & Co., New York, have arranged the sale of $30,000,000 4 per cent. general mortgage bonds, guaranteed by the Mexican government, to a group of French bankers.

New York City Railway.—The Receivers of the New York City Railway and the Metropolitan Street Railway have been authorized by Judge Lacombe in the United States Circuit Court to cancel the leases of the Central Park, North & East River Railroad, known as the Belt Line, and the Twenty-eighth and Twenty-ninth street railways. The Receivers say that these roads are operated at a loss.

New York, New Haven & Hartford.—Mackay & Co., New York, have brought suit in Connecticut to obtain from the Supreme Court of Errors of that state a decision sustaining the New Haven company in issuing its securities and securities of subsidiary companies under special authority of the General Assembly of Connecticut but without first obtaining the permission of the Massachusetts legislature.

Pennsylvania Lines West.—The Pennsylvania Company, whose $60,000,000 capital stock is owned by the Pennsylvania Railroad, has declared a semi-annual dividend of 3 per cent. The semi-annual dividend paid last December was 4 per cent. and in June, 1907, 3 per cent.

Philadelphia Rapid Transit.—The City Councils on June 25 approved the Philadelphia Rapid Transit Company's proposition to pledge its assets to secure a $5,000,000 loan.

Southern Railway.—See Illinois Central.

Tennessee Central.—See Illinois Central.

Toledo Railways & Light.—The interest due July 1 on the $4,866,000 outstanding consolidated first mortgage 4 per cent. bonds, was not paid. The interest on the $1,066,000 first mortgage 5 per cent. bonds of the Toledo Consolidated Street Railway and the interest on the $4,234,000 first consolidated 5 per cent. bonds of the Toledo Traction Co. was paid. These two street companies are operated by the Toledo Railways & Light.

Wabash.—The interest due July 1 on the $2,175,000 outstanding series B debenture bonds and on the $453,000 outstanding series A debenture bonds was not paid. On the series A, 6 per cent. was paid in July, 1907, and 3 per cent. in January, 1908. On the series B, 1 per cent. was paid in July, 1907, and 1 per cent. last January.